U.S. Department of the Interior
Bureau of Land Management

Willow Master Development Plan

Environmental Impact Statement

SUPPLEMENT TO THE DRAFT

Volume 3: Appendices B through D

March 2020

Prepared by:
U.S. Department of the Interior
Bureau of Land Management

In Cooperation with:
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Department of Transportation
Native Village of Nuiqsut
Iñupiat Community of the Arctic Slope
City of Nuiqsut
North Slope Borough
State of Alaska

Estimated Total Costs Associated with Developing and Producing this EIS:
$5,005,000

Willow Master Development Plan

Supplement to the Draft Environmental Impact Statement

Appendix B
Subsistence Technical Appendix

March 2020

Estimated Total Costs Associated with Developing and Producing this EIS: $5,005,000
The dollar figure represented here is an approximate cost to date. Previously published costs were estimates for the full EIS process.

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List of Acronyms

ATV	all-terrain vehicle
CRD	Colville River Delta
NSB	North Slope Borough
Project	Willow Master Development Plan Project
SRB&A	Stephen R. Braund and Associates

Glossary Terms

Direct effects analysis area – All subsistence use areas within 2.5 miles of Willow Master Development Plan Project infrastructure.

Household – One or more individuals living in one housing unit, whether or not they are related.

Subsistence use areas – The geographic extent of a resident's or community's use of the environment to conduct traditional subsistence activities.

Subsistence – A traditional way of life in which wild renewable resources are obtained, processed, and distributed for household and community consumption according to prescribed social and cultural systems and values.

1.0 SUBSISTENCE USES OF NUIQSUT AND UTQIAĠVIK

This appendix provides detailed data tables, figures, and discussion related to Nuiqsut and Utqiaġvik (Barrow) **subsistence** uses. The following sections provide a brief introduction to Iñupiat subsistence harvesting patterns, followed by a description of each community's **subsistence use areas**, harvest and use data, timing of subsistence activities, travel methods, and resource importance.

1.1 Introduction

The Iñupiat are an Alaska Native people whose territory extends throughout Northwest and Northern Alaska. Archaeological research indicates that humans have occupied northern Alaska for roughly 14,000 years (Kunz and Reanier 1996). At the time of European contact, the North Slope was inhabited by two indigenous Iñupiat populations, the Tagiugmiut and the Nunamiut. The Tagiugmiut ("people of the sea") inhabited coastal areas of the Arctic Coastal Plain and relied primarily on harvests of marine mammals, terrestrial mammals (primarily caribou), and fish. The Nunamiut ("people of the land") inhabited the interior, including the Brooks Range and Arctic Foothills areas, and relied mostly on terrestrial mammals and fish, with caribou comprising the majority of their subsistence harvests. Being located on or near the coast, the study communities of Nuiqsut and Utqiaġvik were traditionally inhabited by the Tagiugmiut. The Iñupiat continue to be the primary occupants of the North Slope today and continue the traditions of their ancestors, including the hunting, harvesting, and sharing of wild resources. Subsistence activities tend to occur near communities, along rivers and coastlines, or at particularly productive sites where resources are known to occur seasonally. Residents often conduct subsistence activities from camps located in areas that provide access to multiple resources throughout the year. Harvesters apply traditional knowledge, which is passed down through generations and learned through experience on the land, to determine the locations, timing, and methods for their subsistence activities. Relevant traditional knowledge includes knowledge about the distribution, migration, and seasonal variation of animal populations, and other environmental factors such as tides, currents, ice, and snow conditions.

Prior to the 1950s, when mandatory school attendance and economic factors such as a decline in fur prices compelled families to permanently settle into centralized communities, the Iñupiat were seminomadic and ranged over large geographic areas for trapping, fishing, gathering, and hunting activities. Contemporary subsistence use areas include many of these traditional use areas. Certain harvest locations are used infrequently or by a small number of harvesters; however, these places may still be important to a community if they are particularly productive areas or if they have cultural, historical, or familial significance to the user. As an example, while the Prudhoe Bay development area is no longer part of the contemporary use area of the Nuiqsut people, residents continue to identify with the area as part of their traditional territory due to its historical use by their ancestors. Like other communities on the North Slope, Nuiqsut and Utqiaġvik have a "mixed, subsistence-market" economy (Walker and Wolfe 1987), where families invest money into small-scale, efficient technologies to harvest wild foods. In recent years, the advent of snow machines and all-terrain vehicles (ATVs), including four-wheelers, has reduced the time required to travel to traditional hunting and harvesting areas, but has also increased the need for cash employment to purchase, maintain, and procure supplies for the new equipment, a hallmark of the mixed cash economy (Ahtuangaruak 1997; Impact Assessment Inc. 1990a, 1990b; SRB&A and ISER 1993; Worl and Smythe 1986).

While the use of camps and cabins continues, residents of the North Slope today more commonly use their communities as a base from which they conduct same-day subsistence activities (Impact Assessment Inc. 1990a; SRB&A 2010b, 2017).

1.2 Subsistence Overview

1.2.1 Nuiqsut

Nuiqsut is located on the Nigliq Channel of the Colville River, in an area that provides abundant opportunities for subsistence harvesting of terrestrial mammals, marine mammals, fish, and waterfowl. Although the location is less advantageous for marine mammal harvests than some other North Slope

communities that are located directly on the coast, the Beaufort Sea is easily accessible via the Nigliq Channel. The Colville River is the largest river system on the North Slope and supports the largest overwintering areas for whitefish, which local residents harvest in substantial quantities (Craig 1987; Seigle, Gutierrez et al. 2016).

The Nuiqsut area was traditionally a gathering place where Iñupiat and Athabascan people gathered to trade and fish, maintaining connections between the Nunamiut and the Tagiugmiut (Brown 1979). After the 1971 passage of the Alaska Native Claims Settlement Act, 27 Iñupiat families from Barrow (since renamed Utqiaġvik) resettled at Nuiqsut to live a more traditional lifestyle and to reclaim their ancestral ties to the area (Impact Assessment Inc. 1990b). The site was selected primarily for its easy access to the main channel of the Colville River for fishing and hunting and for the ease of movement between upriver hunting sites and downriver whaling and sealing sites (Brown 1979).

Today, according to the North Slope Borough's (NSB's) most recent census, Nuiqsut has a population of 449 residents living in 138 **households** (NSB 2016). Primary sources of employment in the community include the village corporation (Kuukpik Corporation), the NSB, and the NSB school district (NSB 2018). Nuiqsut is one of 11 Alaska Eskimo bowhead whaling communities. It is the closest community to the major oil producing fields of the North Slope, which have resulted in impacts to subsistence and sociocultural systems (SRB&A 2009, 2017, 2018) but also provided jobs, corporate dividends, and local revenue.

1.2.1.1 Subsistence Use Areas

Figure B.1 depicts Nuiqsut subsistence use areas for all resources over multiple historic and contemporary time periods (BLM 2004; Brown, Braem et al. 2016; Pedersen 1979, 1986; SRB&A 2010b). Use areas from all these studies overlap with portions of the Willow Master Development Plan Project (Project) area. Lifetime (pre-1979) use areas show Nuiqsut residents using a large area centered on the community to harvest subsistence resources; reported use areas extended offshore approximately 15 miles, as far east as Camden Bay, south along the Itkillik River, and west as far as Teshekpuk Lake. Subsequent use area data show Nuiqsut residents traveling across a progressively larger area to harvest subsistence resources. Use areas for the 1995–2006 time period document Nuiqsut residents traveling beyond Atqasuk in the west, offshore more than 50 miles northeast of Cross Island, overland to Cape Halkett and Utqiaġvik in the north, to Camden Bay in the east, and beyond the Colville River in the south. The majority of these use areas are concentrated around the Colville River, in areas to the southwest of the community, offshore areas north of the Colville River Delta (CRD), and northeast of Cross Island. Use areas for other time periods (1973–1986; 2014) are generally within the extent of the Pedersen (1979) and Stephen R. Braund and Associates (SRB&A) (2010b) use areas described above. SRB&A (2010b) notes that for the 1995–2006 time period, wolf and wolverine use areas continued farther south toward Anaktuvuk Pass but were not documented due to the extent of the map used during interviews.

Nuiqsut subsistence use areas for individual resources are shown on Figures B.2 through B.9 for the time periods listed above, in addition to the 2008–2016 time period (SRB&A 2018) for caribou only. Nuiqsut subsistence use areas for large land mammals are shown on Figures B.2 through B.4. Nuiqsut caribou use areas are shown on Figure B.2. As indicated on the figure, areas consistently used by Nuiqsut residents for caribou hunting are in an overland area between the Ikpikpuk and Kuparuk rivers, north to the coast, and south along the Colville River. The maximum extent of the use areas documented among all the studies extends from Atqasuk in the west toward Point Thomson in the east and south along the Colville and Anaktuvuk rivers to Anaktuvuk Pass. SRB&A's (2010b) overlapping use areas show the greatest number of caribou use areas are concentrated along the Colville River and CRD, along the Itkillik River, and overland to the west and south of the community; these areas generally correspond to the caribou hunting areas reported during the 2008–2016 study years (SRB&A 2018).

Nuiqsut moose use areas (Figure B.3) show residents' consistent use of areas adjacent to the Colville River for moose harvests. While lifetime (pre-1979) use areas were completely confined to the Colville River, more recent moose use areas have expanded to include other tributaries including the Chandler and

Anaktuvuk rivers and Fish (Uvlutuuq) Creek. Moose use areas for the 1995–2006 time period show the highest amount of overlapping use along the Colville River south of Nuiqsut as far as Umiat. Figure B.4 depicts Nuiqsut grizzly bear use areas for the lifetime and 1973–1986 time periods, including areas along the Colville River watershed from Fish (Iqalliqpik) Creek to Umiat.

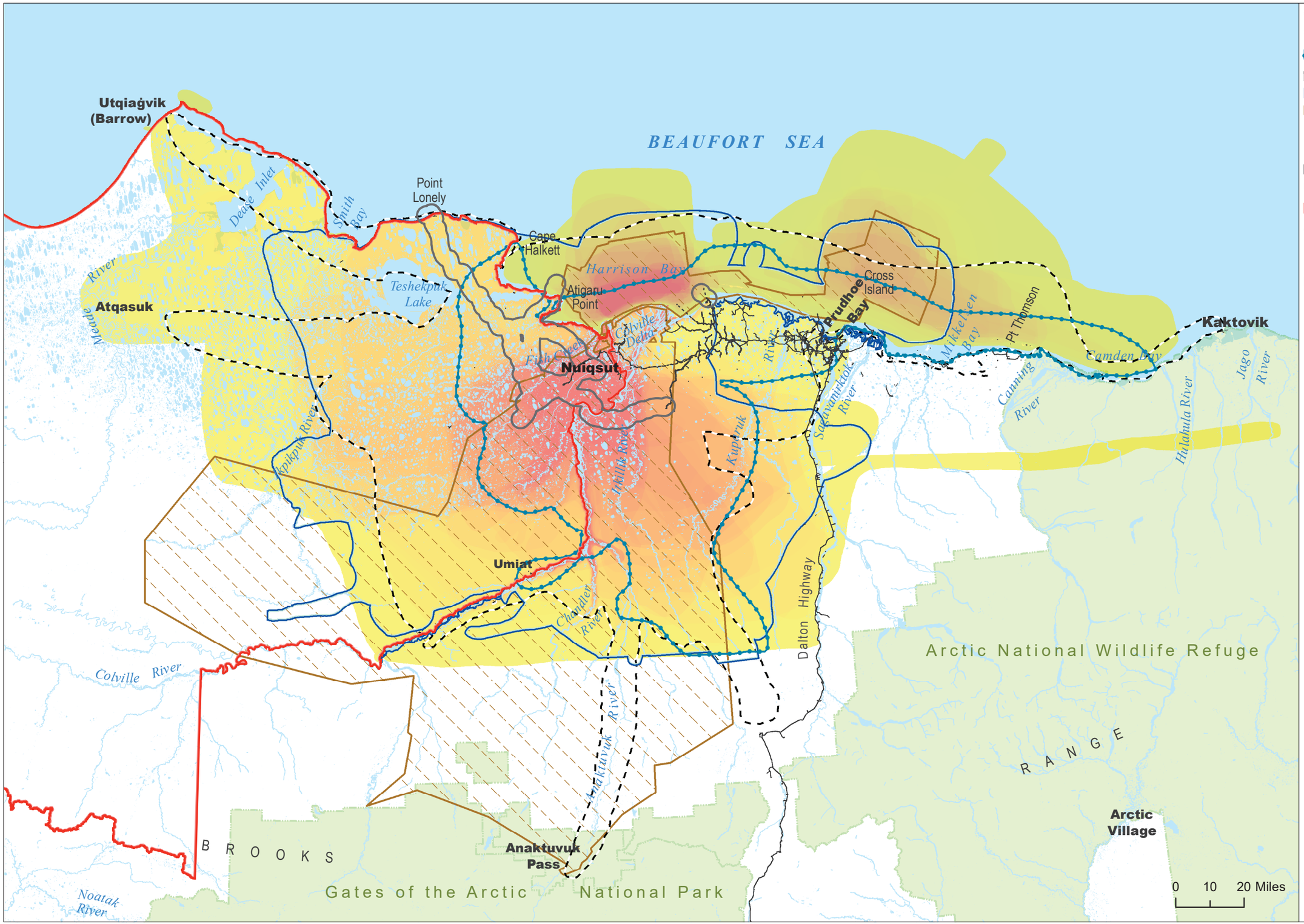
Nuiqsut furbearer and small land mammal use areas are shown on Figure B.5. Lifetime (pre-1979) use areas show residents using overland areas near the community, as well as the more southern Colville, Chandler, Anaktuvuk, Itkillik, and Kuparuk rivers to harvest small land mammals. Subsequent studies, including those for the 1973–1986 and 1995–2006 time periods, depict an expansion from previously recorded use areas. SRB&A's (2010b) wolf and wolverine use areas for the 1995–2006 time period extend to the Meade River in the west and beyond the Dalton Highway in the east, including a single-use area that extends east to just south of Kaktovik. Small land mammal use areas for the most recent available use area study show less use to the east and west of the community and more use south into the Brooks Range.

Nuiqsut fishing areas from multiple time periods are shown on Figure B.6 and indicate consistent use of the Colville River and smaller tributaries including the Itkillik, Chandler, and Anaktuvuk rivers as well as Fish and Judy (Kayyaaq) creeks. Contemporary use areas extend somewhat father along the Colville and Itkillik rivers as well as along Fish Creek.

Nuiqsut use areas for birds (Figure B.7) are mostly concentrated along the Colville River and nearby overland areas for various time periods, though they also include offshore eider hunting areas extending from Cape Halkett to Camden Bay. Lifetime (pre-1979) wildfowl use areas are generally located near the Colville River and in nearshore locations extending east to Prudhoe Bay. More recent goose and eider use areas (1994–2003 and 1995–2006 time periods) occur in a somewhat larger area and include areas offshore and east of Prudhoe Bay to Camden Bay. The most recent documentation of bird use areas for the 2014 time period shows them being north of the community and offshore into Harrison Bay.

Figure B.8 displays Nuiqsut use areas for vegetation for several time periods and shows use of the Colville River as far south as Umiat and areas near Fish (Uvlutuuq) Creek for harvests of vegetation and berries. In addition, berry gathering areas were documented along the Itkillik, Chandler, and Anaktuvuk rivers during a study for the 1994–2003 time period.

Nuiqsut marine mammal use areas (Figure B.9) show use of the Beaufort Sea and CRD at varying extents depending on the time period. Lifetime Nuiqsut use areas for marine mammals included offshore areas from Atigaru Point to Kaktovik at distances of less than 20 miles; subsequent studies documented use areas extending to Cape Halkett in the west and varying distances to the east. SRB&A's (2010b) use areas showed Nuiqsut residents harvesting marine mammals up to 40 miles offshore to the north of the community and even farther offshore (approximately 60 miles) in an area near Cross Island, a sandy barrier island used traditionally and currently as a base of operations for Nuiqsut whaling crews. Nuiqsut 2001–2016 bowhead whale hunting global positioning system tracks extend as far east as Flaxman Island and over 30 miles offshore from Cross Island.



Willow Proposed Development Features

Subsistence Data

- All Resources, Lifetime Previous to 1979 [a]
- All Resources, 1973-1986 [b]
- All Resources, 1994-2003 [c]
- All Resources, 2014 [d]
- Overlapping Subsistence Use Areas All Resources, 1995-2006 [e] (High / Low)
- Direct Effects

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. SRB&A 2010a

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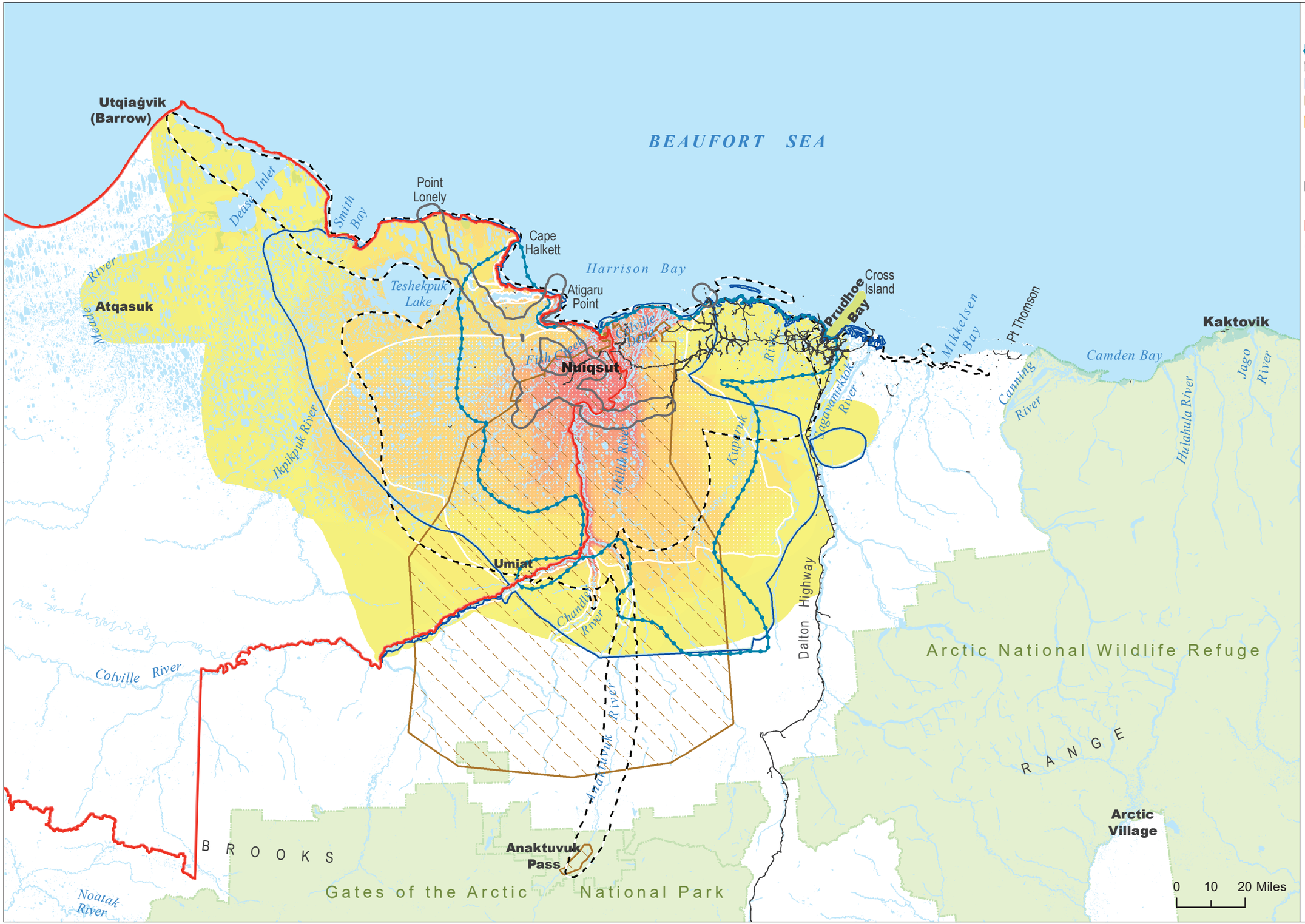
Figure B.1



Willow Proposed Development Features

Subsistence Data

- Caribou, Lifetime prior to 1979 [a]
- Caribou, 1973-1986 [b]
- Caribou, 1994-2003 [c]
- Caribou, 2014 [d]
- Caribou, January 2008 - October 2016 [e]
- Overlapping Subsistence Use Areas Caribou, 1995-2006 [f] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. SRB&A 2018
f. SRB&A 2010a

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Figure B.2

Lifetime previous to 1979 and 1973-1986

1995-2006

1994-2003

2014

All Datasets

Miles 0 10 20

0 10 20 Miles

Lonely Point
Cape Halkett
Harrison Bay
Teshekpuk Lake
Atigaru Point
Atigaru Pt
Colville Delta
Fish Creek
Nuiqsut
Itkillik River
Umiat
Colville River
Chandler River
CD1
CD2
CD3
CD4
CD5
GMT1
GMT2
Anaktuvuk River

Willow Proposed Development Features

Subsistence Data

- Moose, Lifetime previous to 1979 [a]
- Moose, 1973-1986 [b]
- Moose, 1994-2003 [c]
- Moose, 2014 [d]
- Overlapping Subsistence Use Areas Moose, 1995-2006 [e] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. SRB&A 2010a

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Figure B.3

Willow Proposed Development Features

- Grizzly Bear, Lifetime previous to 1979 [a]
- Grizzly Bear, 1973-1986 [b]
- Direct Effects

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986

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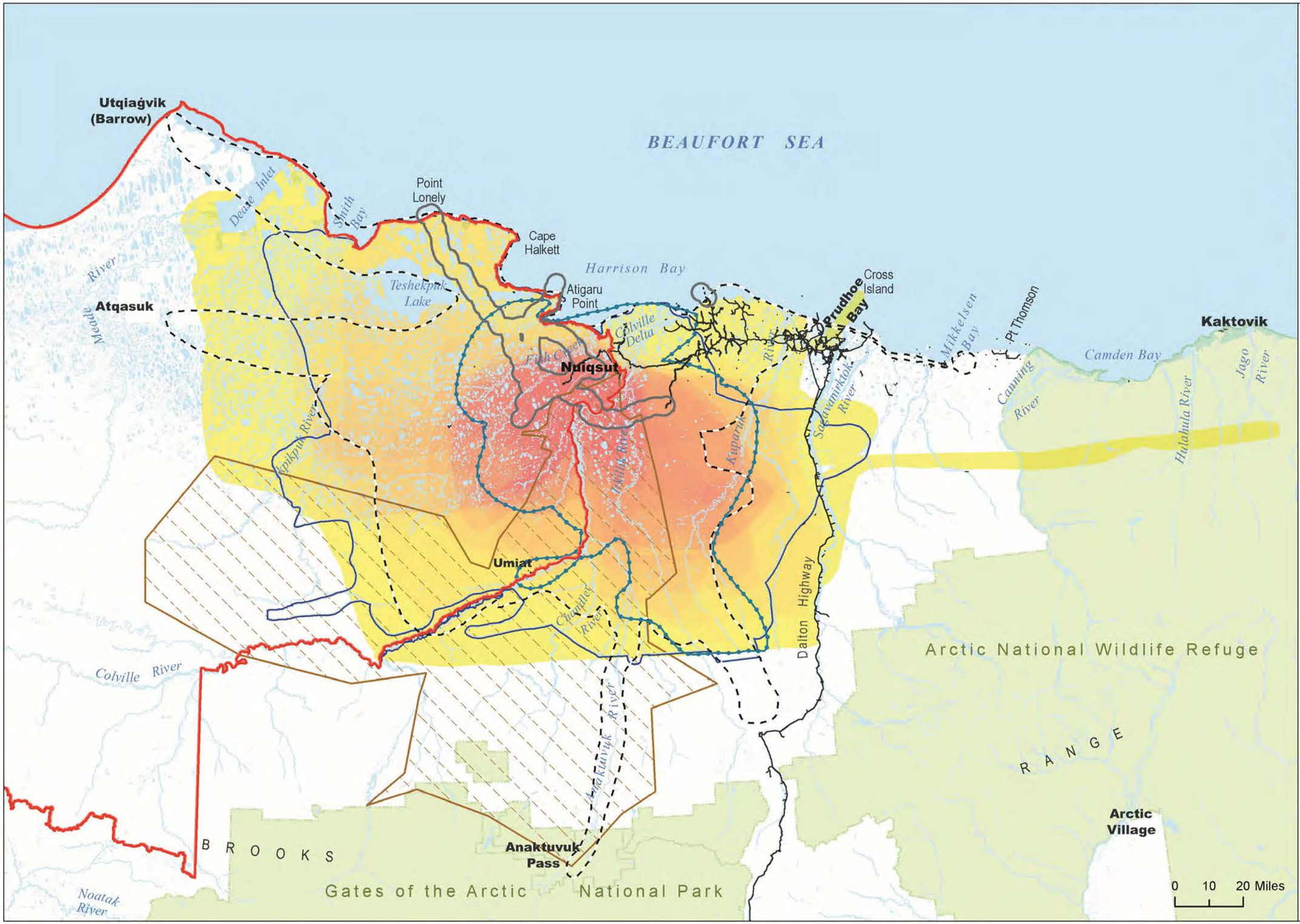
Figure B.4



Willow Proposed Development Features

Subsistence Data

- Furbearer and Trapping, Lifetime previous to 1979 [a]
- Furbearers and Small Land Mammals, 1973-1986 [b]
- Wolf and Wolverine, 1994-2003 [c]
- Small Land Mammals, 2014 [d]
- Overlapping Subsistence Use Areas, Wolf and Wolverine, 1995-2006 [e] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. SRB&A 2010a

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Figure B.5

Willow Proposed Development Features

Subsistence Data

- Fishing, Lifetime previous to 1979 [a]
- Fish, 1973-1986 [b]
- Fish, 1994-2003 [c]
- Fish, 1995-2006 [d]
- Fish, 2014 [e]
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. SRB&A 2010a
e. Brown et al. 2016

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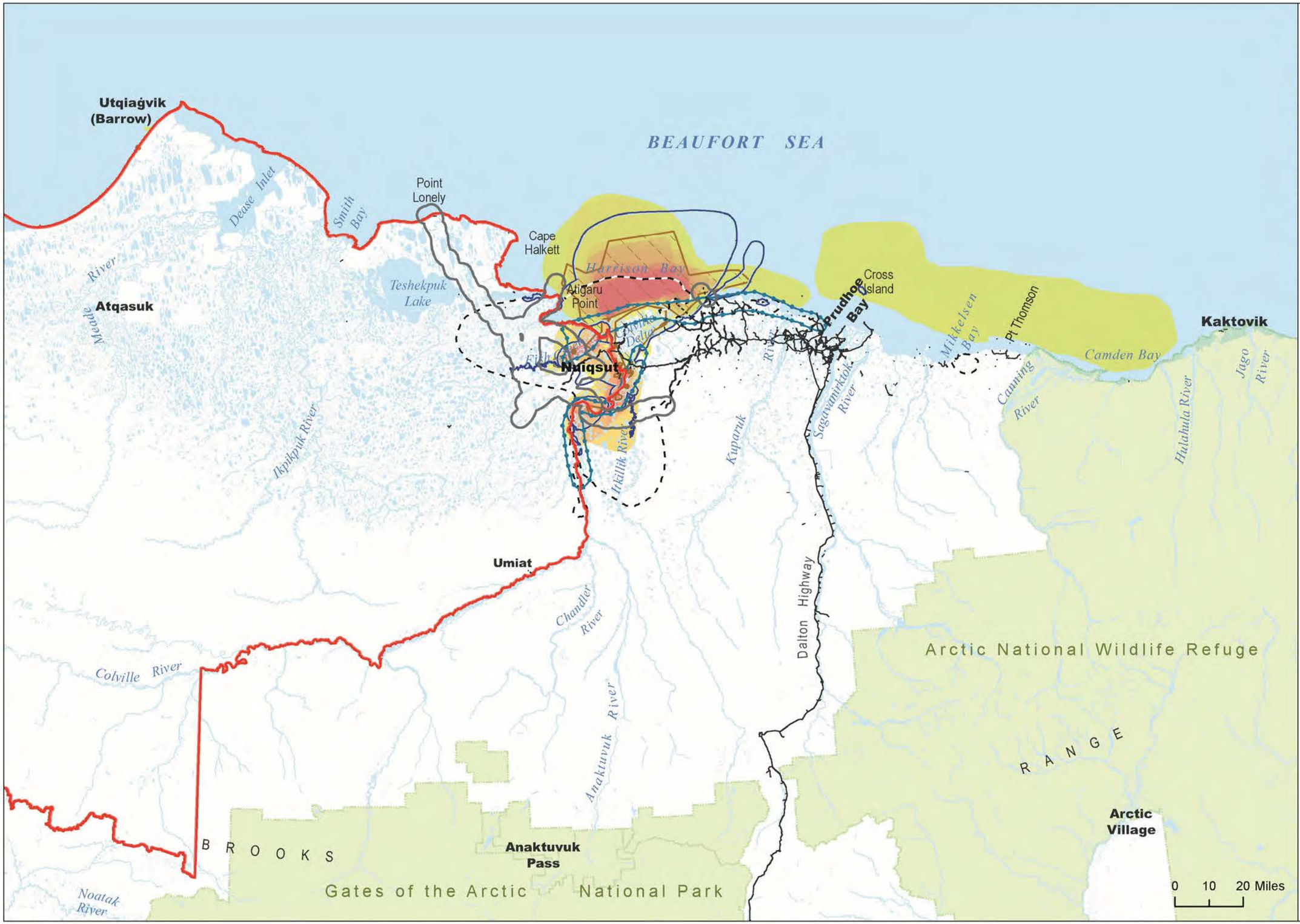
Figure B.6



Willow Proposed Development Features

Subsistence Data

- Wildfowl, Lifetime previous to 1979 [a]
- Wildfowl, 1973-1986 [b]
- Eider and Geese, 1994-2003 [c]
- Ducks, Geese, Eggs and Upland Birds, 2014 [d]
- Overlapping Subsistence Use Areas Eider and Geese, 1995-2006 [e] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
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Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. SRB&A 2010a

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Figure B.7

Willow Proposed Development Features

Subsistence Data

- Vegetation, 1973-1986 [a]
- Berries, 1994-2003 [b]
- Berries and Plants, 2014 [c]
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1986
b. BLM 2004
c. Brown et al.2016

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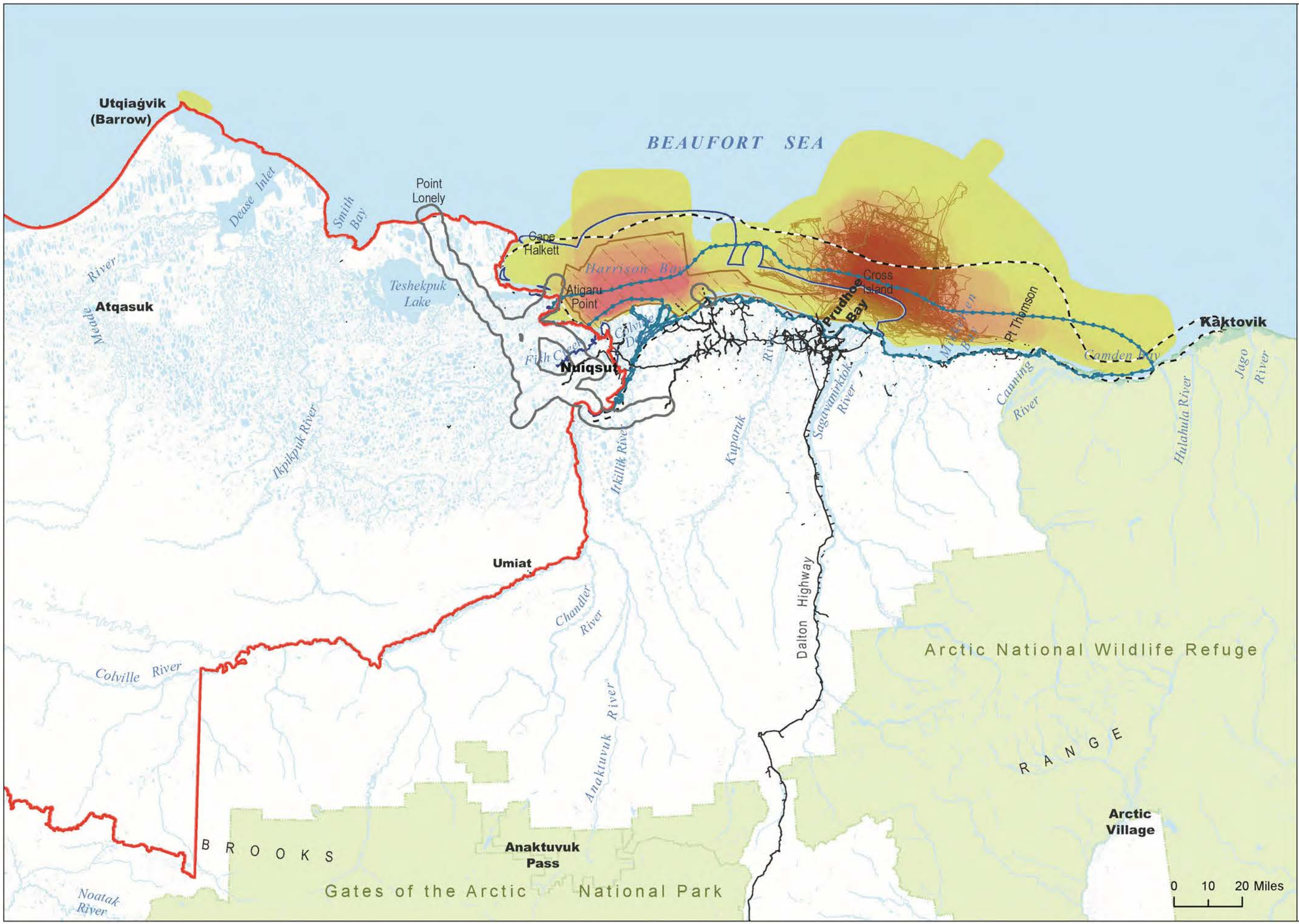
Figure B.8



Willow Proposed Development Features

- Marine Mammals, Lifetime previous to 1979 [a]
- Marine Mammals, 1973-1986 [b]
- Seal, 1994-2003 [c]
- Marine Mammals, 2014 [d]
- Whale Hunting GPS Track, 2001-2016 [e]
- Overlapping Subsistence Use Areas Marine Mammals, 1995-2006 [f] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Pedersen 1986
c. BLM 2004
d. Brown et al. 2016
e. Galginaitis 2017
f. SRB&A 2010a

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Figure B.9

1.2.1.1.1 Direct Effects Analysis Area

Subsistence use of the **direct effects analysis area**, defined as the area within 2.5 miles of Project infrastructure, is relatively high. For the 1995–2006 time period, use areas overlapping the direct effects analysis area accounted for 40% of all use areas documented for Nuiqsut harvesters (Table B.1). Across 9 years of the Nuiqsut Caribou Subsistence Monitoring Project (2008–2016), over half (52%) of caribou use areas overlapped the direct effects analysis area. Areas located within the direct effects analysis area include overland areas to the west, south, and southeast of the community; coastal boating areas to the west and east of the CRD; and riverine boating areas along the Colville and Itkillik rivers and Fish Creek.

Table B.1. Nuiqsut Use Areas within the Direct Effects Analysis Area

Source	Resource Type	Time Period	Total Number of Use Areas	Number (%) of Use Areas in Direct Effects Analysis Area
SRB&A 2010b	All Resources	1995–2006	758	304 (40%)
SRB&A 2010a, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018	Caribou	2008–2016	1,692	884 (52%)

As shown in Figures B.1 through B.9, Nuiqsut harvesters have reported using the direct effects analysis area to harvest the following resources during one or more study years: caribou, moose, other large land mammals, furbearers and small land mammals, fish, birds, vegetation, and marine mammals. Resources that overlap during most study years include caribou, furbearers and small land mammals, fish, and marine mammals. While some resources overlap with a large proportion of the direct effects analysis area (e.g., caribou, furbearers and small land mammals), others overlap with smaller portions, such as where the direct effects analysis area intersects with fishing or hunting areas along Fish Creek and the Colville River (e.g., fish, birds) or in offshore waters near Atigaru Point or Oliktok Point (e.g., marine mammals).

1.2.1.2 Harvest and Use Data

Tables B.2 and B.3 provide Nuiqsut harvest data for various years between 1985 and 2015. Eleven study years include data solely for caribou harvests (Braem, Kaleak et al. 2011; SRB&A 2012, 2013, 2014, 2015, 2016, 2017, 2018) (Table B.3). During available study years, Nuiqsut households have harvested between 399 (in 1985, a year when the community did not successfully harvest a bowhead whale) and 896 (in 2014) pounds of subsistence resources per capita (Table B.2). Land mammals, marine mammals, and fish are all major subsistence resources in Nuiqsut. During four study years, marine mammals contributed more total edible pounds than any other resource. Non-salmon fish were the top harvested resource during the remaining three study years and accounted for between 173 (in 1985) and 248 (in 1993) pounds per capita during years with per capita harvest data. Large land mammals were generally the second- or third-most harvested resource during all study years and provided between 169 (in 1985) and 261 (in 2014) pounds per capita. Nuiqsut residents harvest other resources such as migratory birds, upland game birds, salmon, bird eggs, and vegetation in much smaller quantities. Small land mammals are also harvested, but because they are harvested primarily for their fur and contribute little in the way of edible pounds.

In terms of species, bowhead whales, whitefish (Arctic cisco, or *qaaktaq*, and broad whitefish), and caribou are the primary subsistence species harvested in Nuiqsut. Bowhead whale harvests have accounted for between 28.7% and 60.3% of the total harvest during all study years (except for 1985 and 1994–1995, when Nuiqsut did not successfully harvest a whale) (Table B.3). Arctic cisco harvests have accounted for between 1.9% and 14.9% of the total harvest, broad whitefish have accounted for between 5.3% and 45% of the total harvest, and caribou have accounted for between 21.7% and 37.5% of the total harvest. Other subsistence species with substantial contributions to Nuiqsut subsistence harvests include moose, seals, goose, Arctic grayling, least cisco, and burbot.

Data on subsistence participation and use by Nuiqsut households are available for various study years (Tables B.2 and B.3). As shown in Table B.2, 100% of households report using subsistence resources during study years, and over 90% of households participate in subsistence activities (i.e., attempting to harvest). Across all study years, participation in subsistence activities was highest for non-salmon fish,

large land mammals, and migratory birds. Specifically, in 2014, over half of Nuiqsut households participated in harvests of caribou, broad whitefish, white-fronted goose, cloudberries, and Arctic cisco. In 2016, 76% of households participated in caribou hunting activities. Sharing of subsistence resources, a core Iñupiaq value, is also high among Nuiqsut households; between 95% and 100% of households report receiving subsistence foods during available study years. Sharing is particularly common with marine mammals (between 95% and 100% of households receiving); large land mammals (between 70% and 92% receiving); and non-salmon fish (between 71% and 90% receiving).

Table B.2. Nuiqsut Subsistence Harvest Estimates by Resource Category, All Resources Study Years

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[a]	Estimated Harvest Total Pounds[b]	Estimated Harvest Average Household Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1985	All resources	100	98	98	95	100	–	160,035	2,106	399	100.0
1985	Salmon	60	43	40	23	23	441	1,366	18	3	0.9
1985	Non-salmon fish	100	93	93	83	75	67,712	69,243	911	173	43.3
1985	Large land mammals	98	90	90	80	70	536	67,621	890	169	42.3
1985	Small land mammals	65	63	58	23	13	688	245	3	1	0.2
1985	Marine mammals	100	48	23	30	100	59	13,355	176	33	8.3
1985	Migratory birds	90	90	85	60	55	1,733	6,626	87	17	4.1
1985	Upland game birds	88	88	88	58	13	1,957	1,370	18	3	0.9
1985	Bird eggs	25	25	23	8	10	262	40	1	<1	<0.1
1985	Vegetation	38	50	18	10	20	–	169	2	<1	0.1
1992[c]	All resources	–	–	–	–	–	–	150,195	–	–	100.0
1992[c]	Salmon	–	–	–	–	–	6	65	–	–	0.0
1992[c]	Non-salmon fish	–	74	–	–	–	36,701	51,890	–	–	34.5
1992[c]	Large land mammals	–	–	–	–	–	299	41,386	–	–	27.6
1992[c]	Small land mammals	–	–	–	–	–	46	1	–	–	0.0
1992[c]	Marine mammals	–	–	–	–	–	49	52,865	–	–	35.2
1992[c]	Migratory birds	–	–	–	–	–	1,105	3,655	–	–	2.4
1992[c]	Upland game birds	–	–	–	–	–	378	265	–	–	0.2
1992[c]	Eggs	–	–	–	–	–	25	4	–	–	<0.1
1992[c]	Vegetation	–	32	–	–	–	–	66	–	–	<0.1
1993	All resources	100	94	90	92	98	–	267,818	2,943	742	100.0
1993	Salmon	71	45	36	39	47	272	1,009	11	3	0.4
1993	Non-salmon fish	97	79	79	87	90	71,626	89,481	983	248	33.4
1993	Large land mammals	98	76	74	82	92	691	87,306	959	242	32.6
1993	Small land mammals	53	45	42	27	18	599	84	1	<1	<0.1
1993	Marine mammals	97	58	37	79	97	113	85,216	936	236	31.8
1993	Migratory birds	87	74	73	63	65	2,238	3,540	39	10	1.3
1993	Upland game birds	60	45	45	42	26	973	681	7	2	0.3
1993	Eggs	40	21	19	15	23	346	104	1	<1	<0.1
1993	Vegetation	79	71	71	27	40	–	396	4	1	0.1
1994–1995[d]	All resources	–	–	–	–	–	–	83,228	–	–	100.0
1994–1995[d]	Salmon	–	–	–	–	–	10	31	–	–	<0.1
1994–1995[d]	Non-salmon fish	–	–	–	–	–	15,190	46,569	–	–	56.0
1994–1995[d]	Large land mammals	–	–	–	–	–	263	32,686	–	–	39.3

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[a]	Estimated Harvest Total Pounds[b]	Estimated Harvest Average Household Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1994–1995[d]	Small land mammals	–	–	–	–	–	42	0	–	–	0.0
1994–1995[d]	Marine mammals	–	–	–	–	–	25	1,504	–	–	1.8
1994–1995[d]	Migratory birds	–	–	–	–	–	569	2,289	–	–	2.8
1994–1995[d]	Upland game birds	–	–	–	–	–	58	58	–	–	0.1
1994–1995[d]	Vegetation	–	–	–	–	–	14	91	–	–	0.1
1995–1996	All resources	–	–	–	–	–	–	183,576	–	–	100.0
1995–1996	Salmon	–	–	–	–	–	42	131	–	–	0.1
1995–1996	Non-salmon fish	–	–	–	–	–	10,612	16,822	–	–	9.2
1995–1996	Large land mammals	–	–	–	–	–	364	43,554	–	–	23.7
1995–1996	Small land mammals	–	–	–	–	–	27	0	–	–	0.0
1995–1996	Marine mammals	–	–	–	–	–	178	120,811	–	–	65.8
1995–1996	Migratory birds	–	–	–	–	–	683	2,166	–	–	1.2
1995–1996	Upland birds	–	–	–	–	–	19	13	–	–	<0.1
1995–1996	Vegetation	–	–	–	–	–	12	78	–	–	<0.1
2000–2001	All resources	–	–	–	–	–	–	183,246	–	–	100.0
2000–2001	Salmon	–	–	–	–	–	10	75	–	–	<0.1
2000–2001	Non-salmon fish	–	–	–	–	–	26,545	27,933	–	–	15.2
2000–2001	Large land mammals	–	–	–	–	–	504	62,171	–	–	33.9
2000–2001	Small land mammals	–	–	–	–	–	108	2	–	–	<0.1
2000–2001	Marine mammals	–	–	–	–	–	31	87,929	–	–	48.0
2000–2001	Migratory birds	–	–	–	–	–	1,192	5,108	–	–	2.8
2000–2001	Upland birds	–	–	–	–	–	23	16	–	–	<0.1
2000–2001	Vegetation	–	–	–	–	–	2	13	–	–	<0.1
2014	All resources	100	95	90	91	97	–	371,992	3,444	896	100.0
2014	Salmon	64	41	40	31	35	–	3,889	36	9	1.0
2014	Non-salmon fish	93	78	71	72	71	–	85,106	788	205	22.9
2014	Large land mammals	91	66	64	67	72	–	108,359	1,003	261	29.1
2014	Small land mammals	17	16	10	2	7	–	0	0	0	0.0
2014	Marine mammals	95	55	40	71	95	–	169,367	1,568	408	45.5
2014	Migratory birds	79	71	66	52	38	–	4,742	44	11	1.3
2014	Upland birds	16	12	12	9	5	–	78	1	<1	<0.1
2014	Vegetation	67	55	53	21	38	–	414	4	1	0.1

Source: 1985 (ADF&G 2018); 1992 (Fuller and George 1999); 1993 (Pedersen 1995a); 1994–1995 (Brower and Hepa 1998); 1995–1996, 2000–2001 (Bacon, Hepa et al. 2009); 2014 (Brown, Braem et al. 2016).

Note: The estimated harvest numbers for the 1994–1995, 1995–1996, and 2000–2001 data were derived by summing individual species in each resource category. Also for those study years, total pounds were derived from conversion rates found at ADF&G (2018), and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in (George, Philo et al. n.d.).

[a] Estimated numbers represent individuals in all cases except vegetation, where they represent gallons.

[b] Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers).

[c] The estimated pounds of moose harvested in 1992 is likely too high (Fuller and George 1999).

[d] The 1994–1995 study year underrepresents the harvest of Arctic cisco and humpback whitefish (Brower and Hepa 1998); Nuiqsut did not successfully harvest a bowhead whale in 1994–1995.

Table B.3. Nuiqsut Subsistence Harvest Estimates by Selected Species, All Study Years

Study Year	Resource[a]	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[b]	Estimated Harvest Total Pounds[c]	Estimated Harvest Average Household Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1985	Caribou	98	90	90	80	60	513	60,021	790	150	37.5
1985	Cisco	98	75	73	65	60	46,478	29,354	386	73	18.3
1985	Broad whitefish	95	80	78	70	40	7,900	26,861	353	67	16.8
1985	Bowhead whale	100	23	5	8	100	0	7,458	98	19	4.7
1985	Moose	40	40	18	20	25	13	6,650	88	17	4.2
1985	White-fronted goose	90	90	85	55	48	1,340	6,028	79	15	3.8
1985	Arctic grayling	78	65	63	48	35	4,055	3,650	48	9	2.3
1985	Humpback whitefish	48	45	38	33	13	4,345	3,476	46	9	2.2
1985	Arctic char	75	63	60	33	35	1,060	2,969	39	7	1.9
1985	Burbot	75	60	60	43	33	669	2,675	35	7	1.7
1985	Bearded seal	48	25	15	15	35	15	2,675	35	7	1.7
1985	Ringed seal	53	25	18	23	40	40	1,676	22	4	1.0
1992	Bowhead whale	–	–	–	–	–	2	48,715	–	–	32.4
1992	Caribou	–	81	–	–	–	278	32,551	–	–	21.7
1992	Arctic cisco	–	–	–	–	–	22,391	22,391	–	–	14.9
1992	Broad whitefish	–	–	–	–	–	6,248	15,621	–	–	10.4
1992	Moose[d]	–	–	–	–	–	18	8,835	–	–	5.9
1992	Humpback whitefish	–	–	–	–	–	1,802	4,504	–	–	3.0
1992	Arctic char	–	–	–	–	–	1,544	4,324	–	–	2.9
1992	Bearded seal	–	–	–	–	–	16	2,760	–	–	1.8
1992	Arctic grayling	–	–	–	–	–	3,114	2,491	–	–	1.7
1992	Canada goose	–	–	–	–	–	319	1,437	–	–	1.0
1993	Caribou	98	74	74	79	79	672	82,169	903	228	30.7
1993	Bowhead whale	97	37	5	76	97	3	76,906	845	213	28.7
1993	Broad whitefish	90	66	66	65	66	12,193	41,455	456	115	15.5
1993	Arctic cisco	89	69	68	81	60	45,237	31,666	348	88	11.8
1993	Ringed seal	65	42	31	40	55	98	7,277	80	20	2.7
1993	Burbot	79	63	57	53	55	1,416	5,949	65	16	2.2
1993	Moose	69	47	10	29	63	9	4,403	48	12	1.6
1993	Arctic grayling	79	69	65	44	27	4,515	4,063	45	11	1.5
1993	Least cisco	63	52	47	36	27	6,553	3,277	36	9	1.2
1994–1995[e]	Broad whitefish	–	–	–	–	–	3,237	37,417	–	–	45.0
1994–1995[e]	Caribou	–	–	–	–	–	258	30,186	–	–	36.3
1994–1995[e]	Arctic cisco	–	–	–	–	–	9,842	6,889	–	–	8.3
1994–1995[e]	Moose	–	–	–	–	–	5	2,500	–	–	3.0
1994–1995[e]	Goose unidentified	–	–	–	–	–	474	2,133	–	–	2.6
1994–1995[e]	Ringed seal	–	–	–	–	–	24	1,008	–	–	1.2
1995–1996	Bowhead whale	–	–	–	–	–	4	110,715	–	–	60.3
1995–1996	Caribou	–	–	–	–	–	362	42,354	–	–	23.1
1995–1996	Broad whitefish	–	–	–	–	–	2,863	9,735	–	–	5.3
1995–1996	Ringed seal	–	–	–	–	–	155	6,527	–	–	3.6
1995–1996	Arctic cisco	–	–	–	–	–	5,030	3,521	–	–	1.9
1995–1996	Bearded seal	–	–	–	–	–	17	2,974	–	–	1.6
1995–1996	Least cisco	–	–	–	–	–	1,804	1,804	–	–	1.0
1999–2000	Caribou	–	–	–	–	–	413	–	–	112	–
2000–2001	Bowhead whale	–	–	–	–	–	4	86220	–	–	47.1
2000–2001	Caribou	–	–	–	–	–	496	57,985	–	–	31.6
2000–2001	Arctic cisco	–	–	–	–	–	18,222	12,755	–	–	7.0

Study Year	Resource[a]	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[b]	Estimated Harvest Total Pounds[c]	Estimated Harvest Average Household Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
2000–2001	Broad whitefish	–	–	–	–	–	2,968	10,092	–	–	5.5
2000–2001	White-fronted goose	–	–	–	–	–	787	3,543	–	–	1.9
2000–2001	Moose	–	–	–	–	–	6	3,000	–	–	1.6
2002–2003	Caribou	95	47	45	49	80	397	–	–	118	–
2003–2004	Caribou	97	74	70	81	81	564	–	–	157	–
2004–2005	Caribou	99	62	61	81	96	546	–	–	147	–
2005–2006	Caribou	100	60	59	97	96	363	–	–	102	–
2006–2007	Caribou	97	77	74	66	69	475	–	–	143	–
2010	Caribou	94	86	76	–	–	562	65,754	707	–	–
2011	Caribou	92	70	56	49	58	437	51,129	544	134	–
2012	Caribou	99	68	62	65	79	501	58,617	598	147	–
2013	Caribou	95	79	63	62	75	586	68,534	692	166	–
2014	Bowhead	93	29	21	57	91	5	148,087	1,371	357	39.8
2014	Caribou	90	66	64	67	59	774	105,193	974	253	28.3
2014	Broad whitefish	72	60	59	52	40	11,439	36,605	339	88	9.8
2014	Arctic cisco	83	52	48	59	53	46,277	32,394	300	78	8.7
2014	Bearded seal	67	38	22	40	62	13,846	13,846	128	33	3.7
2014	Least cisco	33	28	28	19	7	13,332	9,333	86	22	2.5
2014	Ringed seal	52	40	35	38	33	108	6,156	57	15	1.7
2015	Caribou	96	84	78	74	72	621	72,631	719	178	–
2016	Caribou	96	76	67	73	73	489	56,277	592	132	–

Source: 1985 (ADF&G 2018); 1992 (Fuller and George 1999); 1993 (Pedersen 1995a); 1994–1995 (Brower and Hepa 1998); 1995–1996, 2000–2001 (Bacon, Hepa et al. 2009); 1999–2000, 2002–2007 (Braem, Kaleak et al. 2011); 2010, 2011, 2012, 2013 (SRB&A 2012, 2013, 2014, 2015); 2014 (Brown, Braem et al. 2016); 2015, 2016 (SRB&A 2017, 2018).

Note: For all resources study years (1985, 1992, 1993, 1994–1995, 1995–1996, 2000–2001), species are listed in descending order by percent of total harvest and are limited to species accounting for at least 1.0% of the total harvest; for single-resource study years, species are listed in descending order by total estimated pounds (or total number harvested, in the case of salmon study years) and limited to the five top species. Years lacking "% of total harvest" data were not comprehensive (i.e., all resources) study years. The estimated harvest numbers for the 1992, 1994–1995, 1995–1996 and 2000–2001 data were derived by summing individual species in each resource category. Also, for those study years, total pounds were derived from conversion rates found at ADF&G (2018) and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in (George, Philo et al. n.d.). For the 2002–2003, 2003–2004, 2004–2005, 2005–2006, 2006–2007, 2010, and 2011 study years, total pounds were derived from conversion rates from (Braem, Kaleak et al. 2011).

[a] This table shows individual species unless they are not available for a given study year.

[b] Estimated numbers represent individuals in all cases except vegetation, where they represent gallons.

[c] Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers).

[d] The estimated pounds of moose harvested in 1992 is likely too high (Fuller and George 1999).

[e] The 1994–1995 study year underrepresents the harvest of Arctic cisco and humpback whitefish (Brower and Hepa 1998); Nuiqsut did not successfully harvest a bowhead whale in 1994–1995.

1.2.1.2.1 Direct Effects Analysis Area

Nuiqsut residents harvest various resources within the direct effects analysis area, including caribou, furbearers (wolf and wolverine), seal, goose, eiders, and fish (broad whitefish and burbot). As shown in Tables B.2 and B.3, caribou are among the top species harvested, in terms of edible weight, by the community of Nuiqsut, as are broad whitefish. During most years, over half of Nuiqsut households participate in the harvests of these resources. Seals, particularly bearded seals, are another important resource that is harvested within the direct effects analysis area. Although not harvested in the same quantities as resources such as caribou and broad whitefish, a substantial proportion of households participate in seal hunting (Table B.2). Similarly, while migratory birds generally account for less than 5% of the total annual harvest, a high percentage of households participate in harvests of these resources (between 70% and 90% across available study years; Table B.2). Wolf and wolverine hunting is an

important, specialized activity that is practiced by a more limited subset of the community but which provides income and supports traditional crafts.

Harvest amounts specific to the direct effects analysis area are available only for caribou. These data show the percentage of the reported caribou harvest that came from the direct effects analysis area between 2008 and 2016. These data represent only the harvests reported by a sample of active harvesters interviewed during each study year and are not based on the total estimated community harvest; thus, other harvests may have occurred within the direct effects analysis area during the study.

As shown in Table B.4, across 9 years of the Nuiqsut Caribou Subsistence Monitoring Project, between 13% and 26% of annual caribou harvests have occurred within the direct effects analysis area. As noted above, residents often travel to the west of their community to hunt caribou by four-wheeler or snow machine in an area east and south of the direct effects analysis area. Caribou often travel through the analysis area before arriving in hunting areas closer to the community.

Table B.4. Nuiqsut Caribou Harvests Within the Direct Effects Analysis Area, 2008–2016

Study Year	Percent of Caribou Harvests Within Direct Effects Analysis Area
Year 1	20
Year 2	17
Year 3	16
Year 4	26
Year 5	22
Year 6	13
Year 7	21
Year 8	14
Year 9	18

Source: SRB&A 2018

Based on data from SRB&A (2010b), which collected subsistence use areas for key resources for the 1995–2006 time period, the direct effects analysis area is used by a majority of wolf/wolverine hunters (100% during the 1995–2006 time period), caribou hunters (94% of harvesters for that resource), moose hunters (94%), goose hunters (70%), and bearded seal hunters (56%) (Table B.5). In addition, a substantial percentage of harvesters use the direct effects analysis area for eider hunting (50%), ringed seal hunting (43%), and broad whitefish harvest (19%). For resources as a whole, the vast majority (97%) of Nuiqsut harvesters reported using the direct effects analysis area during the study period. Based on more recent caribou harvesting data for the 2008–2016 time period, the data show that on an annual basis, between 79% and 97% of respondents use the direct effects analysis area (Table B.6); thus, the area is a key caribou hunting ground for the community.

Table B.5. Percent of Nuiqsut Harvesters Using the Direct Effects Analysis Area, 1995–2006

Resource	Total Number of Respondents for Resource	Number of Respondents in Direct Effects Analysis Area	Percent of Nuiqsut Resource Respondents
Caribou	32	30	94%
Wolverine	24	24	100%
Wolf	23	23	100%
Goose	33	23	70%
Bearded seal	27	15	56%
Ringed seal	23	10	43%
Eiders	28	14	50%
Broad whitefish	26	5	19%
Arctic char	26	4	15%
Moose	31	29	94%
Burbot	30	1	3%
All resources	**33**	**32**	**97%**

Source: SRB&A 2010b

Table B.6. Percent of Nuiqsut Caribou Harvesters Using the Direct Effects Analysis Area, 2008–2016

Study Year	Number Using Direct Effects Analysis Area	Percent Using Direct Effects Analysis Area	Total Respondents
Year 1	35	97%	36
Year 2	49	92%	53
Year 3	52	91%	57
Year 4	56	97%	58
Year 5	52	91%	57
Year 6	46	81%	57
Year 7	56	93%	60
Year 8	49	84%	58
Year 9	50	79%	63

Source: SRB&A 2018

1.2.1.3 Timing of Subsistence Activities

Table B.7 provides data on the timing of Nuiqsut subsistence activities, based on studies from the 1970s through the 2010s. Overall, Nuiqsut harvesters target the highest numbers of resources, including non-salmon fish, caribou, moose and other large land mammals, seals and bowhead whales, and plants and berries, during the summer and fall months of August and September.

Table B.7. Nuiqsut Annual Cycle of Subsistence Activities

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon	M	L	M	M	L	L	M	H	H	H	H	L
Marine non-salmon	–	–	–	–	–	–	–	–	H	H	–	–
Salmon	–	–	–	–	–	–	H	M	–	–	–	–
Caribou	L	L	L	L	L	M	H	H	M	M	L	L
Moose	L	–	–	–	–	–	L	H	H	M	L	L
Bear	M	M	M	L	L	L	L	L	H	M	M	M
Muskox	–	–	–	–	–	–	–	H	H	H	–	–
Furbearers	H	H	H	H	M	L	L	L	L	L	M	H
Small land mammals	–	–	–	–	L	L	H	H	L	–	–	–
Marine mammals	–	–	M	H	L	L	M	H	H	L	L	L
Upland birds	M	M	H	H	M	L	–	L	L	M	M	M
Waterfowl	–	–	–	L	H	H	M	M	M	M	L	L
Eggs	–	–	–	–	–	H	–	–	–	–	–	–
Plants and berries	–	–	–	–	L	L	H	H	–	–	–	–
Total number of resource categories by month	**6**	**5**	**6**	**7**	**9**	**10**	**10**	**12**	**11**	**10**	**8**	**8**

Source: 1995–1996, 2000–2001 (Bacon, Hepa et al. 2009); 2002–2007 (Braem, Kaleak et al. 2011); 1994–1995 (Brower and Hepa 1998); Pre-1979 (Brown 1979); 2014 (Brown, Braem et al. 2016); 2004 (EDAW Inc., Adams/Russel Consulting et al. 2008); 1992 (Fuller and George 1999); 2001–2012 (Galginaitis 2014); 1988 (Hoffman, Libbey et al. 1988); 1979 (Libbey, Spearman et al. 1979); 1995–2006 (SRB&A 2010b); 2008–2016 (SRB&A 2018).
Note: "–" (no documented activity and/or harvests); L (limited activity and/or harvests); M (moderate activity and/or harvests); H (high activity and/or harvests)

The month of April marks the beginning of the spring waterfowl hunting season, which peaks in May and June. Some residents also harvest goose eggs after the birds begin nesting in June. Beginning as early as May (depending on the timing of breakup), residents travel by boat along the local river system and into the Beaufort Sea to harvest various resources including caribou, waterfowl, seals, and fish. Caribou hunting occurs throughout the year, but with the most intensity during the summer months of July and August. During this time, residents also set nets for broad whitefish in local river systems or harvest fish such as Arctic grayling and Dolly Varden with rod and reel, often while hunting caribou along the Colville River. Throughout the summer months, residents also travel to the ocean to hunt for ringed seals, bearded seals, and king and common eiders with some coastal caribou hunting occurring as well (SRB&A 2010b). Most berry and plant gathering occurs in July and August.

Beginning in August and continuing throughout September, some residents shift their focus upriver in search of moose, with caribou often a secondary pursuit during these trips. Summer rod-and-reel harvests

of non-salmon fish, particularly Arctic grayling, continue into the fall as well. Preparation for the bowhead whale hunt begins in August, with whaling crews generally traveling to Cross Island in September. While at Cross Island, Nuiqsut hunters may harvest polar bears and other marine resources; these harvesting events generally occur when whaling is not active due to weather or travel conditions. The fall Arctic cisco fishery, a major community event, may begin in September but is most productive between October and mid-November when the fish are running upriver and residents harvest them in the CRD with gillnets. Other fish, including humpback whitefish, broad whitefish, and least cisco are caught incidentally during this time. Caribou are also harvested during October and November as available to the west of the community.

Starting in November and December and continuing through April, hunters pursue wolves and wolverines and target caribou and ptarmigan as needed and available. Residents may also fish for burbot through the ice during the winter.

1.2.1.3.1 Direct Effects Analysis Area

Nuiqsut harvesters use the direct effects analysis area at varying levels throughout the year (Figure B.10). For resources as a whole for the 1995–2006 time period, uses of the direct effects analysis area are somewhat consistent throughout the year but with a peak in the summer (July and August) and again in mid-to late-winter (January through March). During both the 1995–2006 and 2008–2016 time periods, caribou hunting in the direct effects analysis area peaked from July through September but continued through the winter. Data from the more recent time period (2008–2016) show decreasing use of the direct effects analysis area in the winter months, consistent with the increasing use of ATVs over snow machines to access areas west of Nuiqsut (SRB&A 2018). Summer hunting activities in the direct effects analysis area occur in overland areas to the west of the community, along the Colville River, and to a lesser extent in coastal areas to the west and east of the CRD. Wolf and wolverine hunters use the direct effects analysis area solely during the winter months of November through April, with goose hunting peaking in the spring months of April and May and occurring to a lesser extent in June. Seal and eider hunting occur offshore primarily during the open water months of June through September, although some eider hunting occurs as early as May. Fishing occurs in the direct effects analysis area between June and October, peaking in July and August, and with minimal activity occurring in November and December. These fishing activities occur primarily along the Colville River and in Fish Creek,

1.2.1.4 Travel Method

As shown in Table B.8, boat is the primary travel method used for subsistence pursuits of most resources, including various non-salmon fish, caribou, moose, bowhead whale, seals, and eider. Snow machine is the primary method of travel used for late fall, winter, and early spring pursuits of Arctic cisco, burbot, wolf and wolverine, and goose, and recent data shows that while boat remains the primary method of travel to caribou-use areas, in recent years ATVs and trucks have become much more common while snow machine travel has become less common (SRB&A 2018).

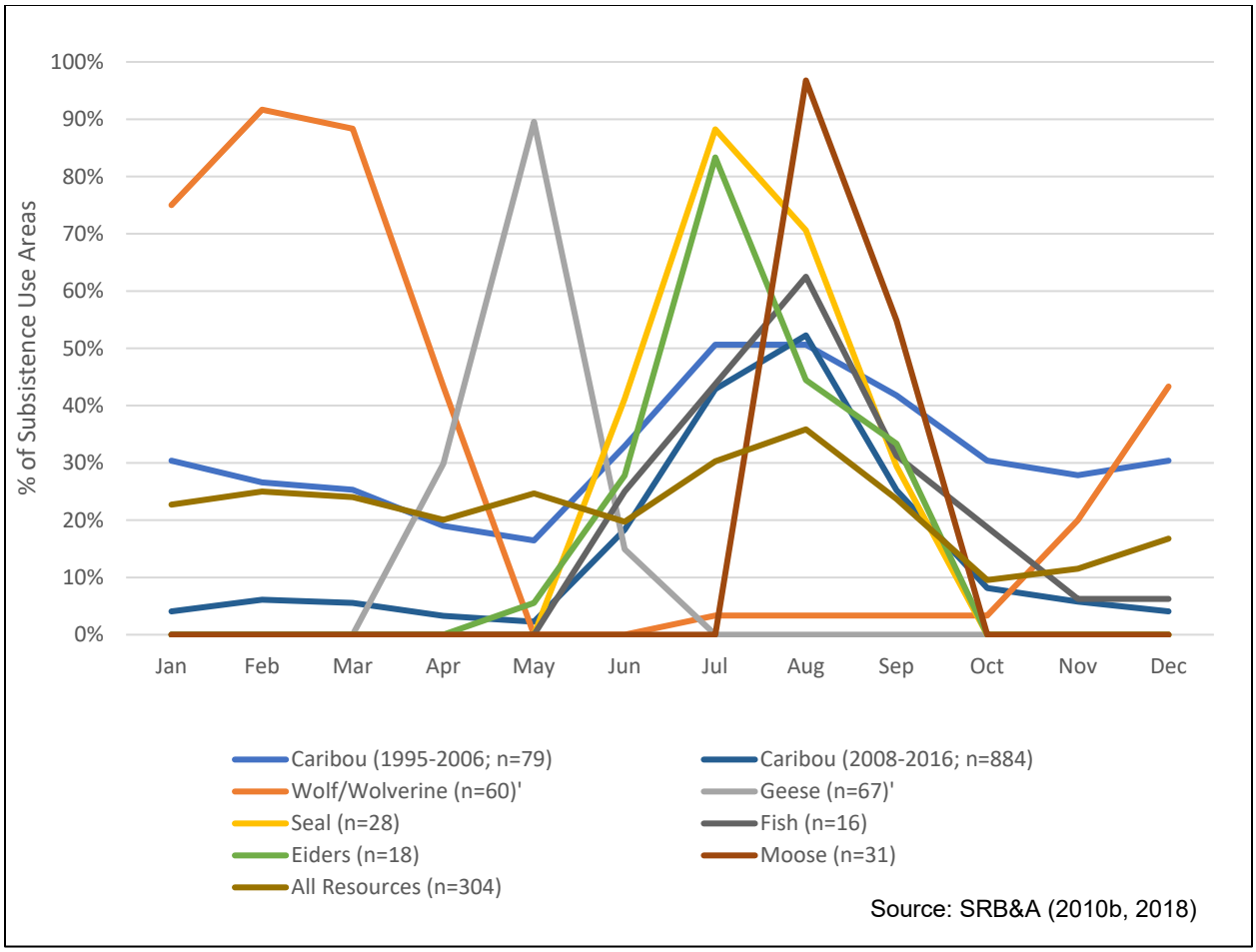


Figure B.10. Nuiqsut Subsistence Use Areas by Month in Direct Effects Analysis Area, by Resource

Table B.8. Nuiqsut Travel Method to Subsistence Use Areas

Resource	Boat	Snow Machine	Foot	Car/Truck	ATV	Plane
Arctic cisco and burbot	L	H	L	M	–	–
Arctic char/Dolly Varden and broad whitefish	H	M	M	–	–	–
Caribou	H	M	–	L	M	–
Moose	H	–	M	–	–	–
Wolf and wolverine	M	H	–	–	–	M
Bowhead whale	H	–	–	–	–	–
Seals	H	M	–	–	–	–
Goose	M	H	M	L	L	–
Eider	H	M	–	–	–	–
Total number of resources targeted	**9**	**7**	**4**	**3**	**2**	**1**

Source: 1995–2006 (SRB&A 2010b); 2008–2016 (SRB&A 2018).
Note: ATV (all-terrain vehicle); "–" (no documented use of travel method); L (limited use of travel method); M (moderate use of travel method); H (high use of travel method). Caribou based on SRB&A (2017). All others based on SRB&A (2010a).

1.2.1.4.1 Direct Effects Analysis Area

Because the direct effects analysis area includes terrestrial, riverine, and marine areas, travel methods used by Nuiqsut harvesters vary by location. As shown in Figure B.11, for the 1995–2006 time period, snow machine was the primary method used to access the direct effects analysis area, followed closely by boat. No other travel methods were used (except minimally) within the direct effects analysis area.

Specifically, for caribou, Nuiqsut residents primarily accessed the area by boat, followed by snow machine. During the 2008–2016 time period, Nuiqsut caribou hunters primarily accessed the direct effects analysis area by boat (67% of use areas). A smaller percentage of use areas were accessed during that time period by snow machine (18%) or ATV (four-wheeler) (14%). Figure B.11 shows an increase in the use of ATVs in the direct effects analysis area during the 2008–2016 time period. Recent data from the Caribou Subsistence Monitoring Project also show increased use of trucks to access caribou hunting areas west of the community due to the construction of easily accessible gravel roads (SRB&A 2018).

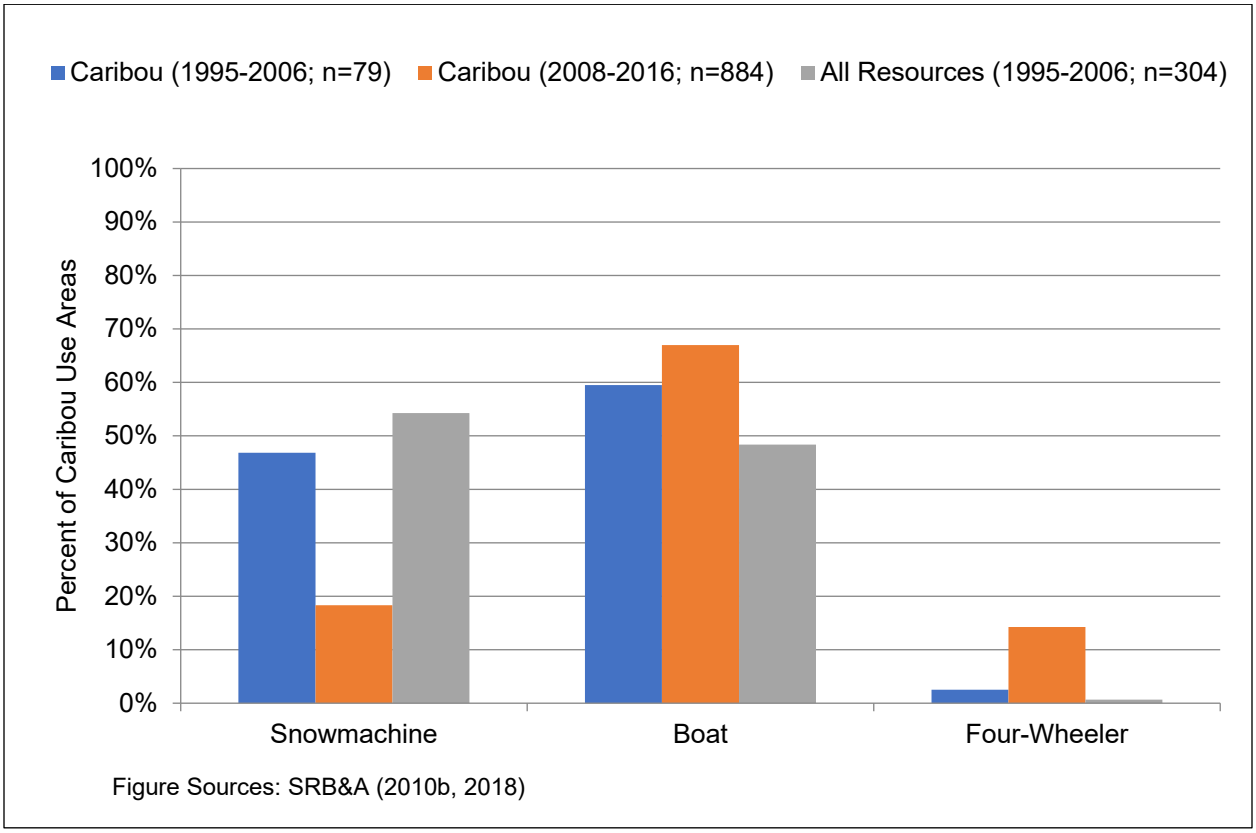


Figure B.11. Nuiqsut Travel Methods in Direct Effects Analysis Area

1.2.1.5 Resource Importance

An analysis of resource importance based on harvest (percent of total harvest), harvest effort (percent of households attempting harvests), and sharing (percent of households receiving) variables is provided in Table B.9. Based on this analysis, resources of major importance in Nuiqsut are Arctic cisco, Arctic grayling, bearded seal, bowhead whale, broad whitefish, burbot, caribou, cloudberry, white-fronted goose, and driftwood.

Table B.9. Relative Importance of Subsistence Resources Based on Selected Variables, Nuiqsut

Resource Category	Resource[a]	Percent of Households Trying to Harvest	Percent of Households Receiving	Percent of Total Harvest
Major resources[b]	Arctic cisco	61	57	8.8
Major resources[b]	Arctic grayling	50	24	1.0
Major resources[b]	Bearded seal	32	50	1.6
Major resources[b]	Bowhead whale[c]	30	96	30.4
Major resources[b]	Broad whitefish	69	49	15.5
Major resources[b]	Burbot	51	35	1.0
Major resources[b]	Caribou	73	75	29.9
Major resources[b]	Cloudberry	55	29	0.0

Resource Category	Resource[a]	Percent of Households Trying to Harvest	Percent of Households Receiving	Percent of Total Harvest
Major resources[b]	White fronted goose	62	36	1.4
Major resources[b]	Wood[d]	50	3.2	0.0
Moderate resources[e]	Arctic char	38	22	0.9
Moderate resources[e]	Arctic fox	14	1	0.0
Moderate resources[e]	Beluga	2	24	0.0
Moderate resources[e]	Bird eggs	16	12	0.0
Moderate resources[e]	Blueberries	29	16	0.0
Moderate resources[e]	Brant	17	9	0.1
Moderate resources[e]	Brown bear	14	18	0.2
Moderate resources[e]	Canada goose	42	24	0.4
Moderate resources[e]	Chum salmon	23	11	0.6
Moderate resources[e]	Ground squirrel	45	8	0.1
Moderate resources[e]	Humpback whitefish	26	9	1.0
Moderate resources[e]	King eider	24	19	0.0
Moderate resources[e]	Least cisco	40	17	1.1
Moderate resources[e]	Long-tailed duck	8	13	0.0
Moderate resources[e]	Moose	40	41	2.5
Moderate resources[e]	Pink salmon	28	17	0.4
Moderate resources[e]	Polar bear	7	29	0.2
Moderate resources[e]	Ptarmigan	48	15	0.2
Moderate resources[e]	Rainbow smelt	13	22	0.1
Moderate resources[e]	Red fox	22	2	0.0
Moderate resources[e]	Ringed seal	36	43	1.6
Moderate resources[e]	Snow goose	19	7	0.0
Moderate resources[e]	Spotted seal	13	5	0.1
Moderate resources[e]	Walrus	7	43	0.2
Moderate resources[e]	Wolf	18	6	0.0
Moderate resources[e]	Wolverine	22	5	0.0
Minor resources[f]	Arctic cod	7	7	0.0
Minor resources[f]	Chinook salmon	2	9	0.0
Minor resources[f]	Coho salmon	3	5	0.0
Minor resources[f]	Common eider duck	7	3	0.1
Minor resources[f]	Cranberries	9	5	0.0
Minor resources[f]	Crowberries	7	2	0.0
Minor resources[f]	Dall sheep	–	9	0.0
Minor resources[f]	Dolly Varden	10	3	0.4
Minor resources[f]	Lake trout	3	8	0.0
Minor resources[f]	Muskox	–	8	0.3
Minor resources[f]	Northern pike	7	7	0.0
Minor resources[f]	Northern pintail	5	1.6	0.0
Minor resources[f]	Round whitefish	5	1	0.1
Minor resources[f]	Saffron cod	7	–	0.0
Minor resources[f]	Sheefish	–	6	0.0
Minor resources[f]	Sockeye salmon	3	6	0.0
Minor resources[f]	Sourdock	5	7	0.0
Minor resources[f]	Weasel	5	–	0.0

Source: 1985 (ADF&G 2018); 1992 (Fuller and George 1999); 1993 (Pedersen 1995b); 1994–1995 (Brower and Hepa 1998); 1995–1996, 2000–2001 (Bacon, Hepa et al. 2009); 1999–2000, 2002–2007 (Braem, Kaleak et al. 2011); 2010, 2011, 2012, 2013 (SRB&A 2012, 2013, 2014, 2015); 2014 (Brown, Braem et al. 2016); 2016 (SRB&A 2018).

[a] For space considerations, resources that contributed an average of less than 1% of harvest, less than 5% attempting harvests, and less than 5% receiving harvests are categorized as minor and are not be shown.

[b] Major resources contribute > 9% total harvest, have ≥ 50% of households attempting harvest, or have ≥ 50% of households receiving resource.

[c] Averages include unsuccessful bowhead whale harvest years.

[d] The inclusion of wood is based on a single study year (1993); data on wood were not collected during any other study year.

[e] Moderate resources contribute 2% to 9% of total harvest, have 11% to 49% of households attempting harvest, or have 11% to 49% of households receiving resource.

[f] Minor resources contribute < 2% of total harvest, have ≤ 10% of households attempting harvest, or have ≤ 10% of households receiving resource.

1.2.2 Utqiaġvik

Utqiaġvik (Barrow) is the North Slope's most populous community and is located on the northern coast of the Chukchi Sea. The town site is approximately 7.5 miles south of Point Barrow, the demarcation point between the Chukchi and Beaufort seas. In 2016, residents of Barrow voted to formally rename the town to its original Iñupiaq name of Utqiaġvik. The community is also traditionally known as Ukpeagvik, which means "place where snowy owls are hunted" (NSB 2018). Continuous occupation of the Utqiaġvik area began approximately 1,300 years ago. Following European contact in the early 1800s, the growth of the commercial whaling and trapping industries brought Iñupiat from across the North Slope to Utqiaġvik in pursuit of employment and trade opportunities. The Naval Petroleum Reserve 4 was established in 1923, and during World War II, the U.S. Navy established a base camp in Utqiaġvik in the late 1940s as a place to launch oil exploration in the reserve (Jensen 2009). The established mission of the naval base camp shifted away from oil exploration in the 1950s, and the base became the Naval Arctic Research Laboratory. Throughout the late 1900s, Utqiaġvik continued to grow as new economic opportunities, including oil and gas exploration, arose on the North Slope. Today, Utqiaġvik is the headquarters for various regional organizations and corporations including the NSB and the Arctic Slope Regional Corporation (NSB 2016). In 2014, the population of Utqiaġvik was estimated at 4,825 residents living in 1,588 households; 65.9% were Alaska Native (NSB 2016). The community remains primarily Iñupiat, and subsistence remains an important part of the community's identity and social fabric.

1.2.2.1 Subsistence Use Areas

Figure B.12 depicts Utqiaġvik subsistence use areas for all resources for various historic and contemporary time periods (BLM 2004; Brown, Braem et al. 2016; Pedersen 1979; SRB&A 2010b, Unpublished; SRB&A and ISER 1993). Time periods range from lifetime use areas documented in 1979 (Pedersen 1979) to single-year use areas documented in 2014 (Brown, Braem et al. 2016). Lifetime (pre–1979) use areas include locations as far south as the Colville River near Umiat, beyond Nuiqsut in the east, offshore from the community to the southeast and southwest, and inland beyond Wainwright toward Point Lay. Harvest sites and use areas for the 1987–1989 time period are similar to those recorded for the pre–1979 time period but extend farther offshore from the community. The harvest sites for this time period are concentrated in offshore areas between Peard Bay and Smith Bay and onshore areas extending south from the community beyond the Colville River and into the foothills of the Brooks Range. More recent use areas studies for the 1994–2003 and 1997–2006 time periods show somewhat larger use area extents, with use areas extending well offshore to the north of the community, east toward the Kuparuk River area, south to the Colville River, and as far west as Point Lay. Overlapping subsistence use areas for the 1997–2006 time period show the greatest concentration of use areas occurring offshore from the community up to 20 miles and in an overland area south of the community and along the Chipp and Ikpikpuk rivers. Use areas for the 2014 time period are consistent with these areas of highest overlapping use. In addition, some isolated use areas were reported for the 2014 time period offshore from Icy Cape and near Point Lay.

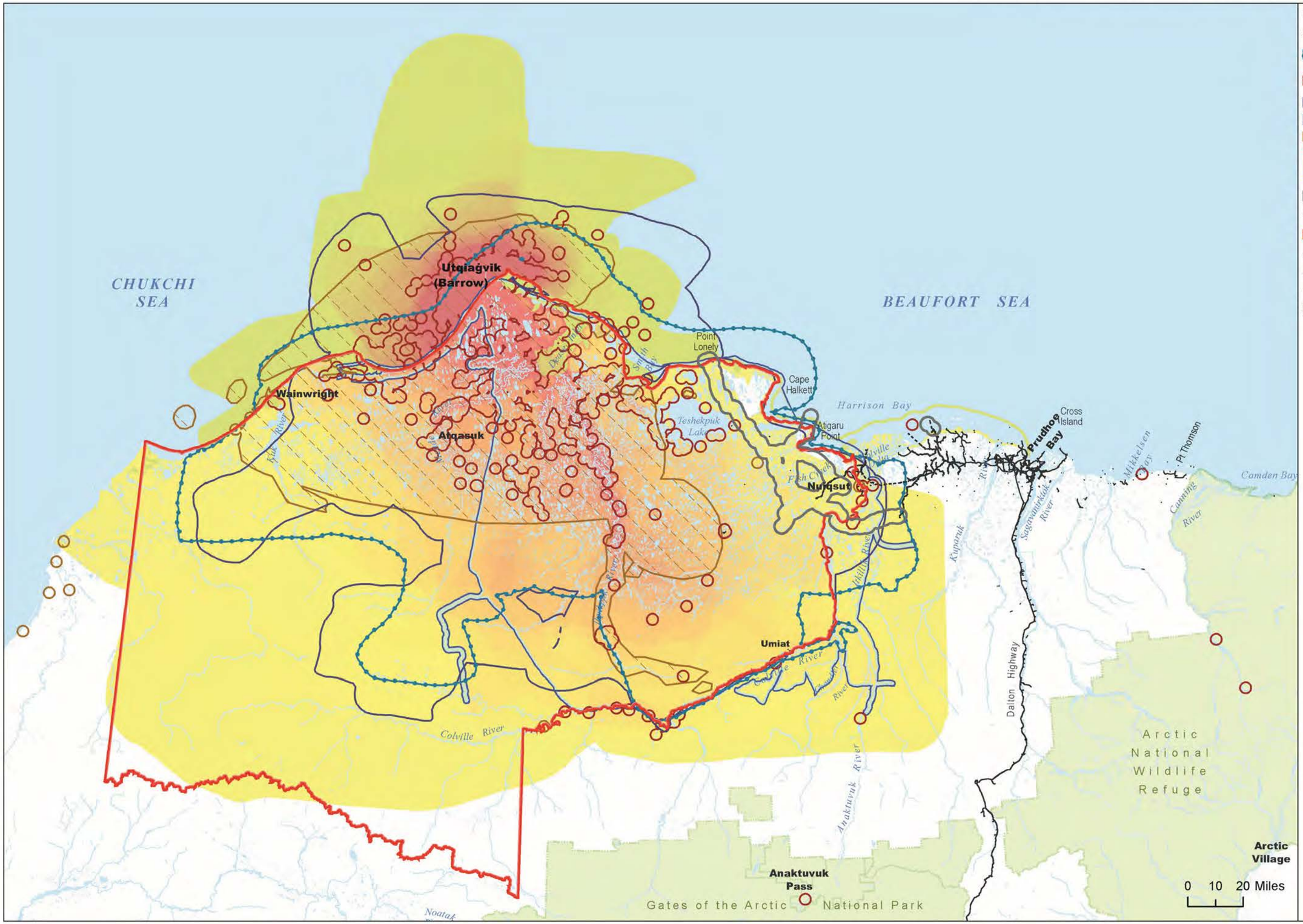
Resource-specific use area maps for Utqiaġvik are shown in Figures B.13 through B.20 for the time periods mentioned above. Utqiaġvik subsistence use areas for large land mammals are shown in Figures B.13 through B.15. Caribou use areas (Figure B.13) cover an extensive area from Icy Cape to Prudhoe Bay and as far south as the Colville River. Caribou hunting areas for the 1997–2006 time period extend farther south and east than previous time periods; the highest numbers of overlapping caribou use areas extend in an overland area approximately 30 miles south of the community and along local river systems. Caribou use areas for the most recent time period (2014) are generally within those documented for the 1997–2006 time period. Figure B.14 depicts Utqiaġvik moose use areas, and for most time periods, shows use concentrated along the Colville River where moose are more likely to be found. Use areas from the 1997–2006 and 2014 time periods indicate use of a considerably larger area extending between Utqiaġvik and the Colville River. Utqiaġvik use areas for other large land mammals (e.g., grizzly/brown bear, Dall sheep, and polar bear) are shown on Figure B.15. Polar bear use areas occur in the Chukchi Sea at distances of no more than 20 miles from shore, while grizzly bear use areas are concentrated in various inland areas bounded by Wainwright and the Kuk River in the west, and the Ikpikpuk River in the east.

Utqiaġvik small land mammal use areas (Figure B.16) cover an extensive area from Point Lay to the Kuparuk River and beyond the Colville River in the south. The extent of furbearer and small land mammal use areas has expanded over time. Lifetime furbearer and small land mammal use areas cover areas from Wainwright in the west to Nuiqsut in the east, and as far south as the Colville River, while 1997–2006 use areas for wolf and wolverine extend beyond Icy Cape to Point Lay in the west, past Nuiqsut to the Kuparuk River in the east, and well beyond the Colville River in the south. High numbers of overlapping use areas occur south and east of the community toward the Colville River. Small land mammal use areas for the most recent time period (2014) occurred primarily along the Ikpikpuk River toward the Colville River.

Utqiaġvik fishing areas for all available time periods are depicted in Figure B.17 and show residents fishing across a large river and lake system to the south of the community, west to the Kuk River near Wainwright, and as far east as Teshekupk Lake and the Colville River. Most time periods also show fish harvesting in coastal waters and lagoon systems in the Chukchi and Beaufort seas. More recent use areas from the 1994–2003, 1997–2006, and 2014 time periods occur along river and lake systems to the south and east of the community as far as the Teshkpuk Lake and upper Judy Creek areas.

Utqiaġvik use areas for birds (Figure B.18), including eiders and goose, are relatively consistent over time, though extending considerably farther offshore during the 1997–2006 time period (SRB&A 2010b). Use areas are located in the vicinity of Utqiaġvik, offshore at a distance greater than 40 miles, inland beyond Atqasuk in the west, and east as far as Nuiqsut. Bird use areas from more recent time periods (1994–2003, 1997–2006, and 2014) are concentrated along the Meade, Chipp, and Ikpikpuk rivers. Utqiaġvik harvests of vegetation (including berries and plants) and wood are depicted in Figure B.19 for various time periods. The vegetation and wood harvests generally occur to the south and southeast of the community, in addition to coastal areas (primarily for driftwood). More recent use areas for the 2014 time period occur over a large area extending southwest to Wainwright and southeast to the Ikpikpuk River. Several isolated berry and plant harvesting areas have also been reported as far as Point Lay and Colville River.

Utqiaġvik subsistence use areas for marine mammals are shown on Figure B.20 and occur at varying offshore distances in the Beaufort and Chukchi seas. The offshore extent of marine mammal use areas has grown over time. SRB&A's (2010b) 1997–2006 marine mammals use areas show Utqiaġvik residents traveling beyond Wainwright in the west and offshore more than 80 miles, with the highest numbers of overlapping use areas occurring between 10 and 25 miles from shore. During the 2014 time period, marine mammal use areas occurred between Icy Cape and Dease Inlet, and up to approximately 40 miles from shore.



Willow Proposed Development Features

Subsistence Data

- All Resources, Lifetime Previous to 1979 [a]
- All Resource Harvest Sites Buffered, 1987-1989 [b]
- All Resources, 1987-1989 [c]
- All Resources, 1994-2003 [d]
- All Resources, 2014 [e]
- Overlapping Subsistence Use Areas All Resources, 1997-2006 [f] (High / Low)
- Direct Effects

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. SRB&A Unpublished
d. BLM 2004
e. Brown et al. 2016
f. SRB&A 2010a

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Figure B.12

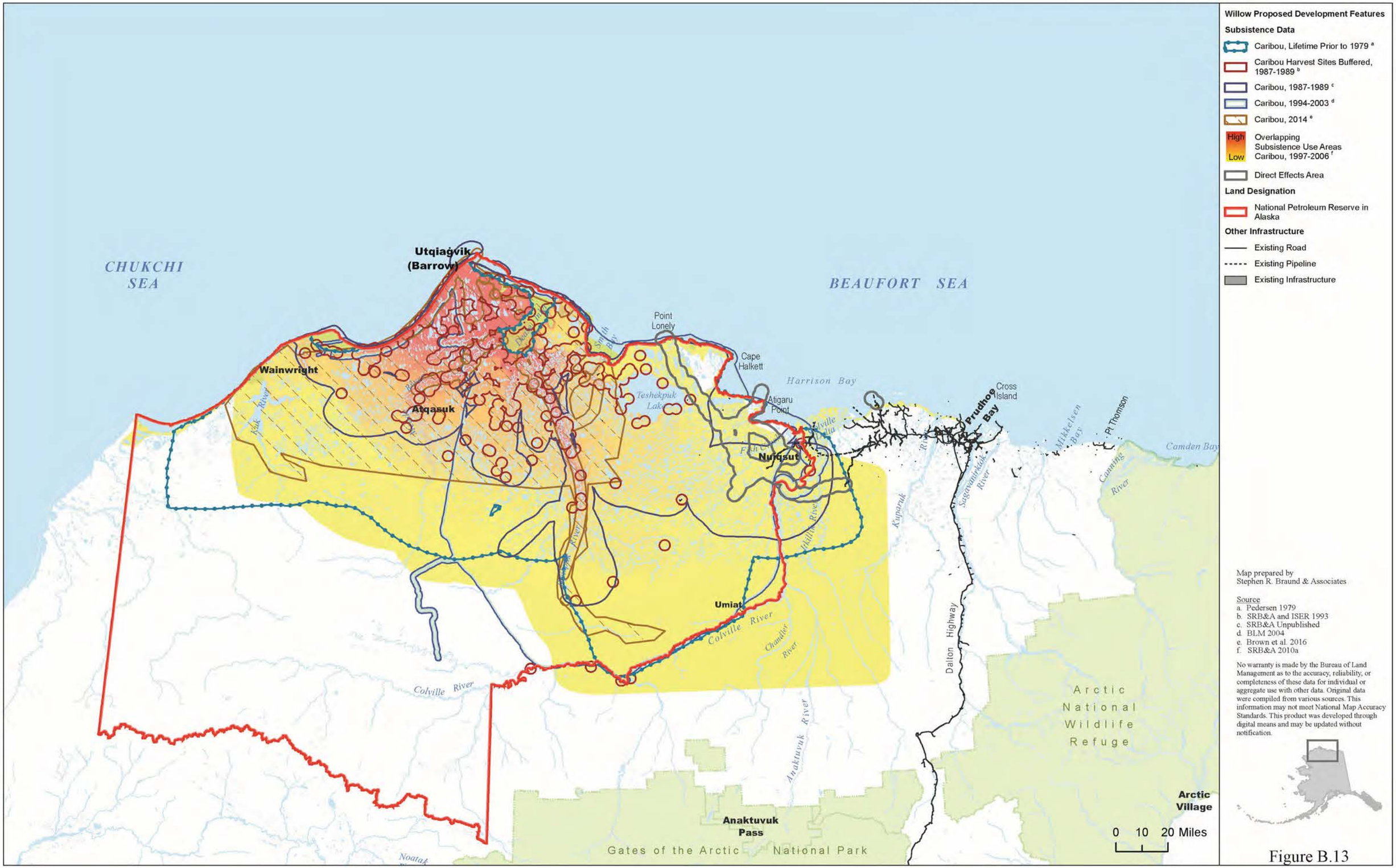
Willow Proposed Development Features
Subsistence Data
Caribou, Lifetime Prior to 1979 a
Caribou Harvest Sites Buffered, 1987-1989 b
Caribou, 1987-1989 c
Caribou, 1994-2003 d
Caribou, 2014 e
High
Low
Overlapping Subsistence Use Areas Caribou, 1997-2006 f
Direct Effects Area
Land Designation
National Petroleum Reserve in Alaska
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
CHUKCHI SEA
BEAUFORT SEA
Utqiaġvik (Barrow)
Wainwright
Atqasuk
Point Lonely
Cape Halkett
Harrison Bay
Atigaru Point
Teshekpuk Lake
Nuiqsut
Umiat
Cross Island
Prudhoe Bay
Pt Thomson
Camden Bay
Mikkelsen Bay
Canning River
Sagavanirktok River
Kuparuk River
Itkillik River
Colville River
Chandler River
Anaktuvuk River
Dalton Highway
Arctic National Wildlife Refuge
Arctic Village
Anaktuvuk Pass
Gates of the Arctic National Park
Noatak
0 10 20 Miles
Map prepared by
Stephen R. Braund & Associates
Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. SRB&A Unpublished
d. BLM 2004
e. Brown et al. 2016
f. SRB&A 2010a
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Figure B.13

CHUKCHI SEA

BEAUFORT SEA

Utqiaġvik (Barrow)

Wainwright

Atqasuk

Nuiqsut

Umiat

Point Lonely

Cape Halkett

Atigaru Point

Harrison Bay

Prudhoe Bay

Cross Island

Pt. Thomson

Camden Bay

Arctic Village

Anaktuvuk Pass

Gates of the Arctic National Park

Arctic National Wildlife Refuge

Dalton Highway

Kuk River

Meade River

Ikpikpuk River

Colville River

Itkillik River

Kuparuk River

Sagavanirktok River

Canning River

Chandler River

Anaktuvuk River

Fish Creek

Colville Delta

Mikkelsen Bay

Teshekpuk Lake

Dease Inlet

Smith Bay

0 10 20 Miles

Willow Proposed Development Features

Subsistence Data

- Moose, Lifetime Previous to 1979 [a]
- Moose Harvest Sites Buffered, 1987-1989 [b]
- Moose, 1987-1989 [c]
- Moose, 1994-2003 [d]
- Moose, 2014 [e]
- Overlapping Subsistence Use Areas Moose, 1997-2006 [f] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. SRB&A Unpublished
d. BLM 2004
e. Brown et al. 2016
f. SRB&A 2010a

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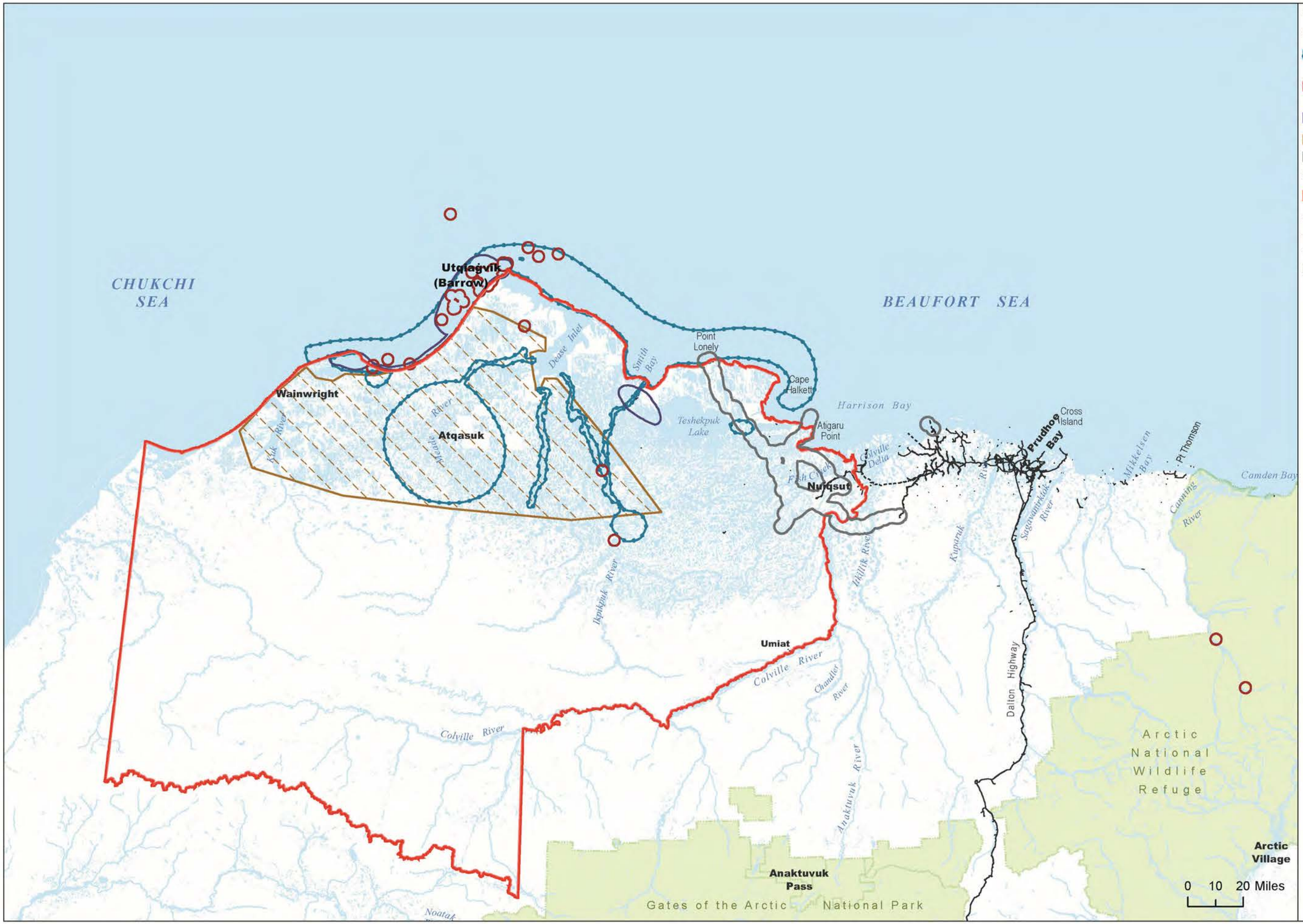
Figure B.14



Willow Proposed Development Features

Subsistence Data

- Grizzly Bear and Polar Bear, Lifetime Previous to 1979 [a]
- Brown Bear, Dall Sheep and Polar Bear Harvest Sites Buffered, 1987-1989 [b]
- Brown Bear and Polar Bear, 1987-1989 [c]
- Brown Bear, 2014 [d]
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. SRB&A Unpublished
d. Brown et al. 2016

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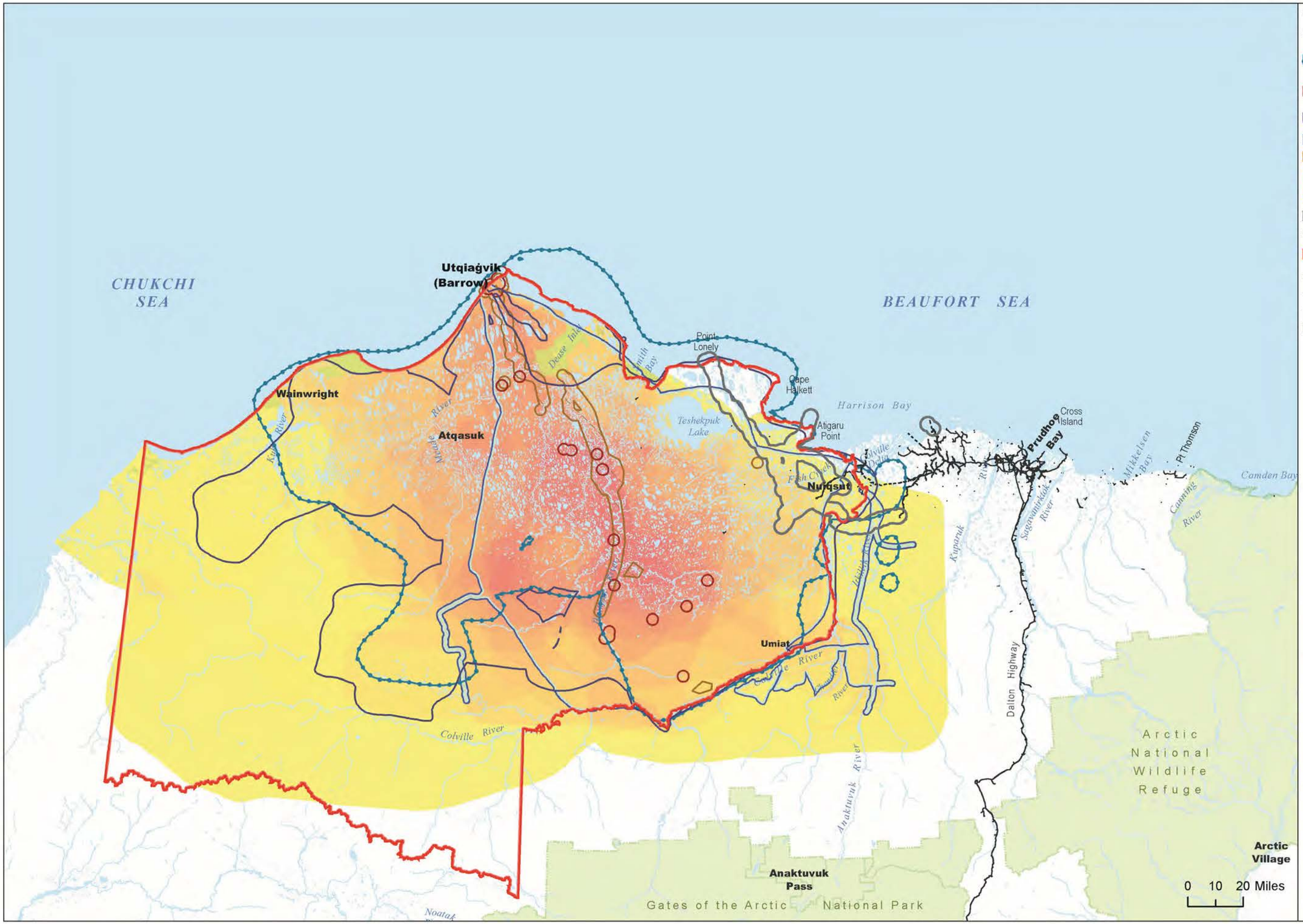
Figure B.15



Willow Proposed Development Features

Subsistence Data

- Furbearers, Small Land Mammals and Trapping, Lifetime Previous to 1979 [a]
- Furbearer and Small Land Mammal Harvest Sites Buffered, 1987-1989 [b]
- Furbearer and Small Land Mammals, 1987-1989 [c]
- Wolf and Wolverine, 1994-2003 [d]
- Small Land Mammals, 2014 [e]
- Overlapping Subsistence Use Areas Wolf and Wolverine 1997-2006 [f] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. SRB&A Unpublished
d. BLM 2004
e. Brown et al. 2016
f. SRB&A 2010a

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Figure B.16

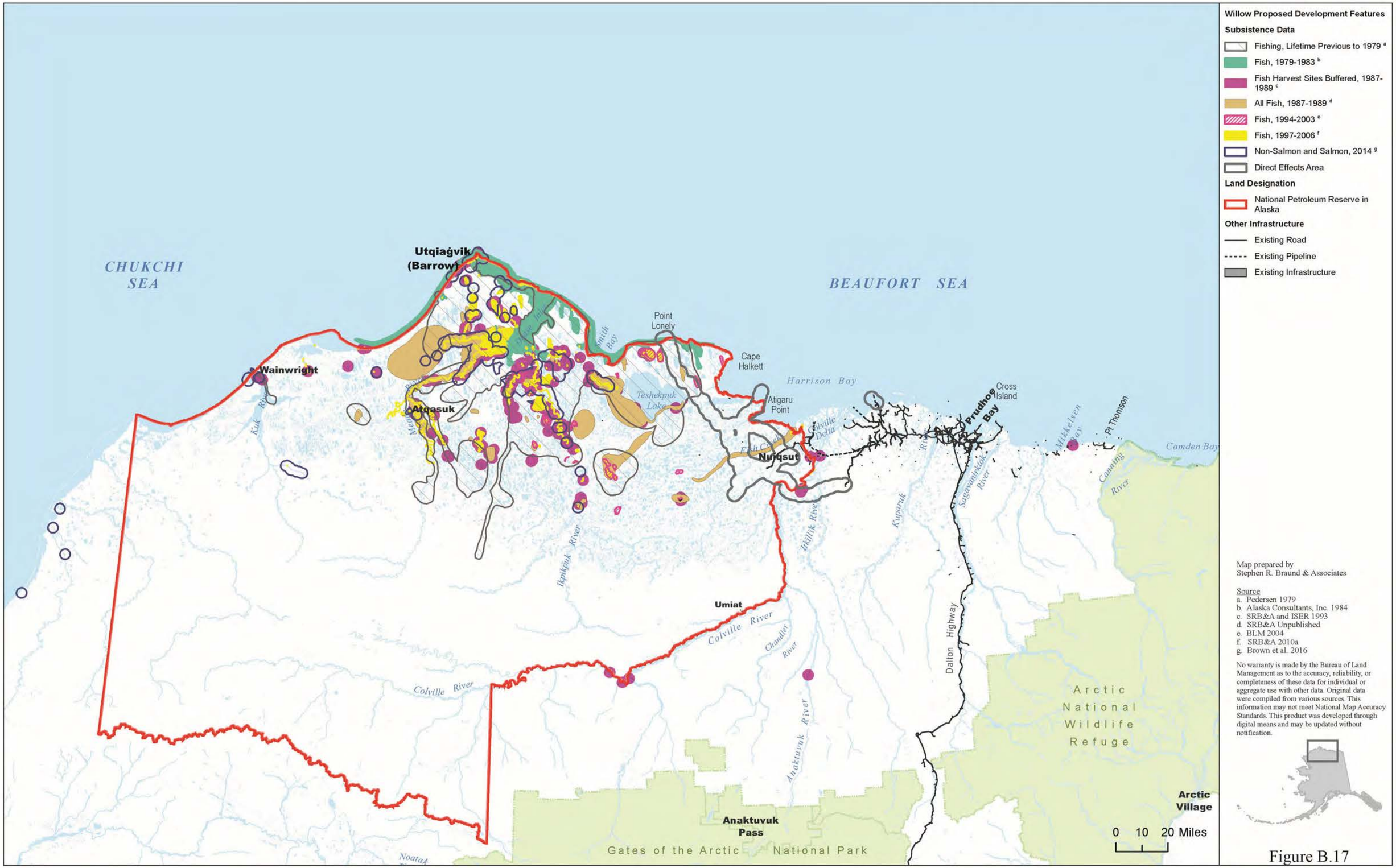
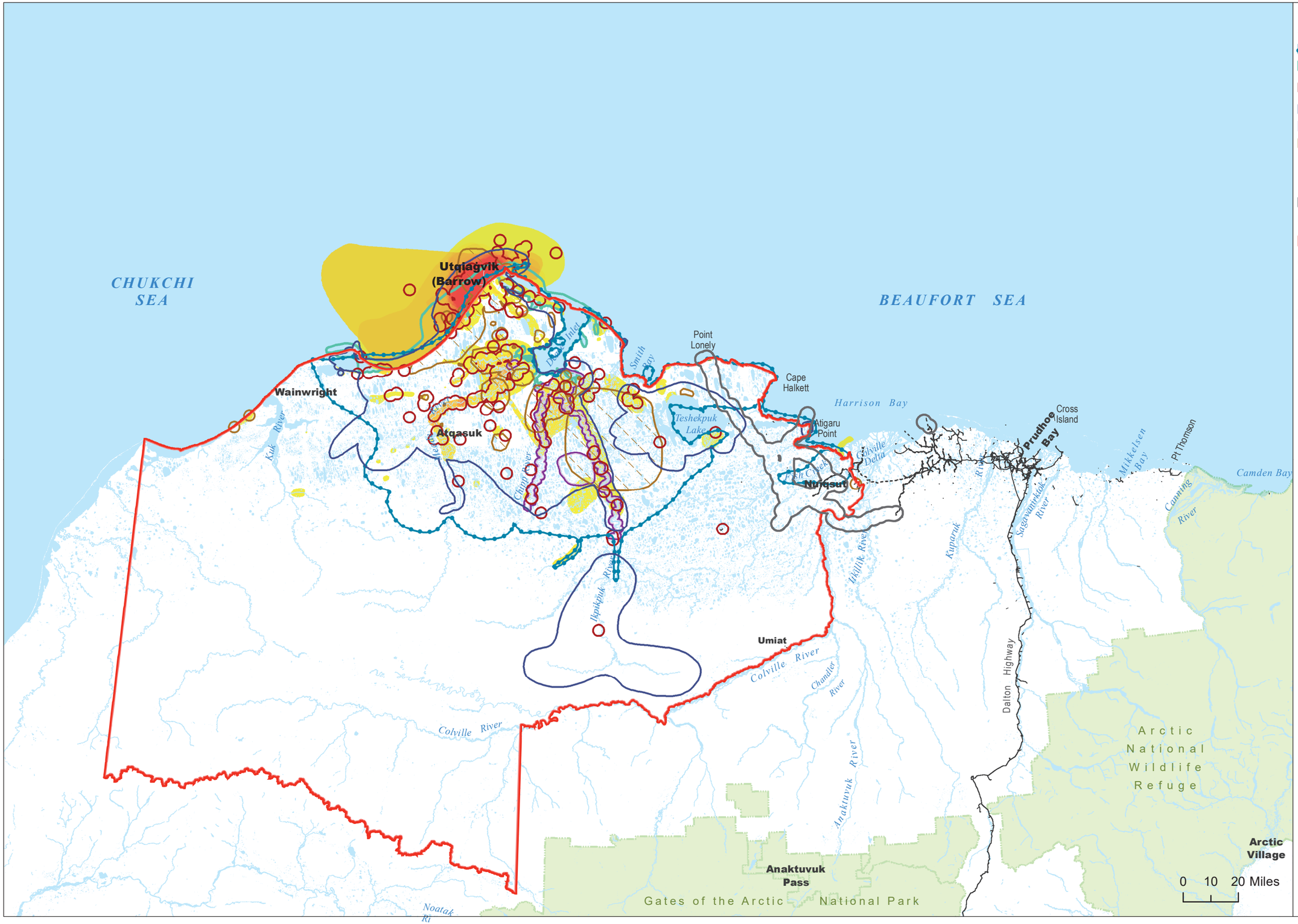

Willow Proposed Development Features
Subsistence Data
Fishing, Lifetime Previous to 1979 a
Fish, 1979-1983 b
Fish Harvest Sites Buffered, 1987-1989 c
All Fish, 1987-1989 d
Fish, 1994-2003 e
Fish, 1997-2006 f
Non-Salmon and Salmon, 2014 g
Direct Effects Area
Land Designation
National Petroleum Reserve in Alaska
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
CHUKCHI SEA
BEAUFORT SEA
Utqiaġvik (Barrow)
Wainwright
Atqasuk
Point Lonely
Cape Halkett
Harrison Bay
Atigaru Point
Teshekpuk Lake
Nuiqsut
Cross Island
Prudhoe Bay
Pt Thomson
Camden Bay
Umiat
Colville River
Dalton Highway
Arctic National Wildlife Refuge
Arctic Village
Anaktuvuk Pass
Gates of the Arctic National Park
0 10 20 Miles
Map prepared by
Stephen R. Braund & Associates
Source
a. Pedersen 1979
b. Alaska Consultants, Inc. 1984
c. SRB&A and ISER 1993
d. SRB&A Unpublished
e. BLM 2004
f. SRB&A 2010a
g. Brown et al. 2016
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure B.17



Willow Proposed Development Features

Subsistence Data

- Wildfowl, Lifetime Previous to 1979 [a]
- Birds, 1979-1983 [b]
- Bird Harvest Sites Buffered, 1987-1989 [c]
- Birds, 1987-1989 [d]
- Geese, 1994-2003 [e]
- Birds, 2014 [f]
- Overlapping Subsistence Use Areas Eider and Geese, 1997-2006 [g] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Alaska Consultants, Inc. 1984
c. SRB&A and ISER 1993
d. SRB&A Unpublished
e. BLM 2004
f. SRB&A 2010a
g. Brown et al. 2016

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Figure B.18

CHUKCHI SEA

BEAUFORT SEA

Utqiaġvik (Barrow)

Wainwright

Atqasuk

Point Lonely

Cape Halkett

Harrison Bay

Atigaru Point

Nuiqsut

Prudhoe Bay

Cross Island

Pt Thomson

Camden Bay

Umiat

Dalton Highway

Arctic National Wildlife Refuge

Arctic Village

Anaktuvuk Pass

Gates of the Arctic National Park

Dease Inlet

Smith Bay

Teshekpuk Lake

Kuk River

Meade River

Ikpikpuk River

Fish Creek

Colville Delta

Itkillik River

Kuparuk River

Sagavanirktok River

Mikkelsen Bay

Canning River

Colville River

Chandler River

Anaktuvuk River

Noatak

0 10 20 Miles

Willow Proposed Development Features

Subsistence Data

- Vegetation and Wood, Lifetime Previous to 1979 [a]
- Berry and Plant Harvest Sites Buffered, 1987-1989 [b]
- Berries, 1994-2003 [c]
- Berries and Plants, 2014 [d]
- Direct Effects

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. SRB&A and ISER 1993
c. BLM 2004
d. Brown et al. 2016

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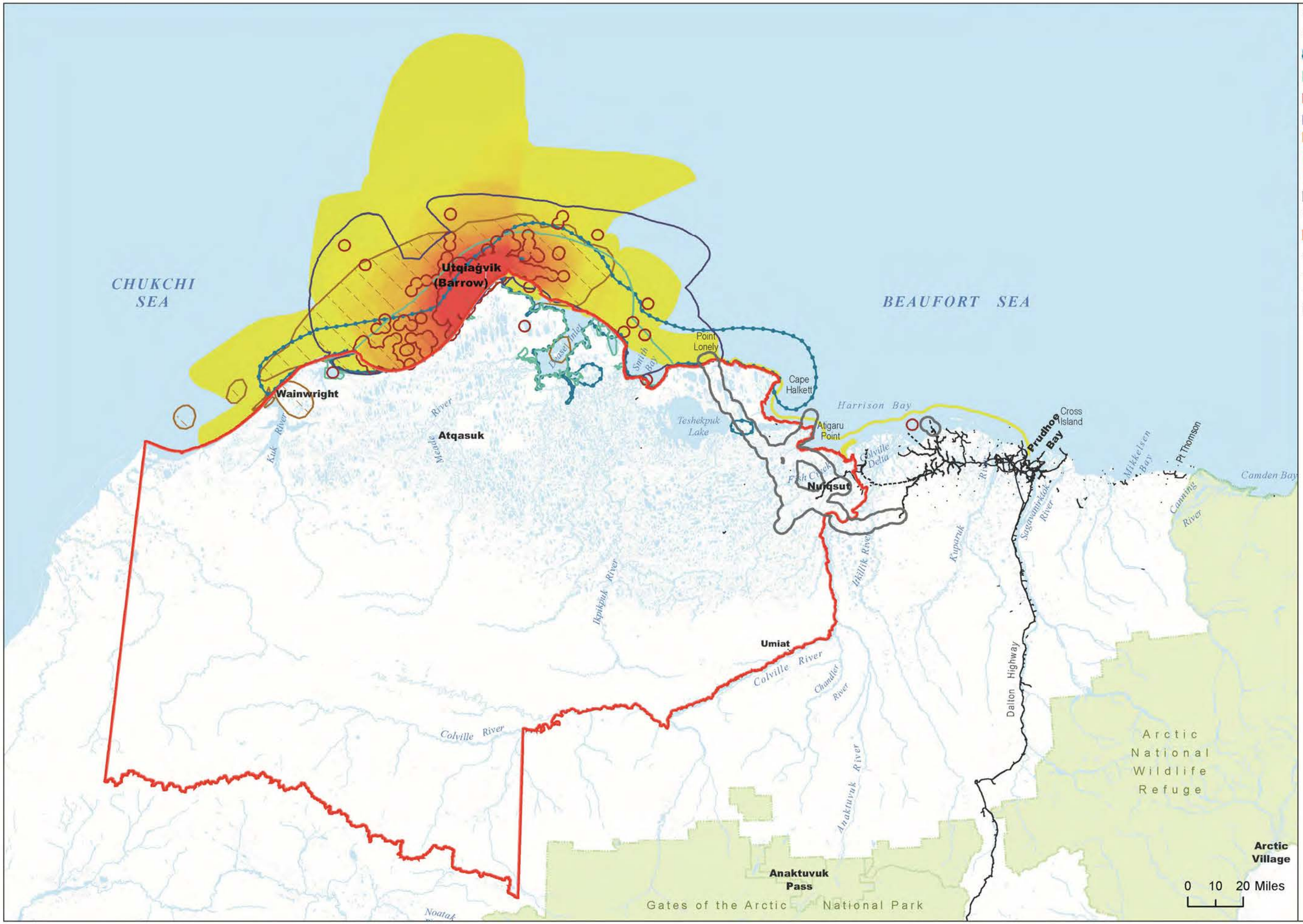
Figure B.19



Willow Proposed Development Features

Subsistence Data

- Marine Mammals, Lifetime Previous to 1979 [a]
- Marine Mammals, 1979-1983 [b]
- Marine Mammal Harvest Sites Buffered, 1987-1989 [c]
- Marine Mammals, 1987-1989 [d]
- Marine Mammals, 2014 [e]
- Overlapping Subsistence Use Areas Marine Mammals, 1997-2006 [f] (High / Low)
- Direct Effects Area

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. Pedersen 1979
b. Alaska Consultants, Inc. 1984
c. SRB&A and ISER 1993
d. SRB&A Unpublished
e. Brown et al. 2016
f. SRB&A 2010a

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure B.20

1.2.2.1.1 Direct Effects Analysis Area

Subsistence use of the direct effects analysis area, defined as the area within 2.5 miles of Project infrastructure, is limited among Utqiaġvik harvesters. For the 1995–2006 time period, use areas overlapping the direct effects analysis area accounted for only 3% of all use areas documented for Utqiaġvik harvesters (Table B.10).

Table B.10. Utqiaġvik Use Areas within the Direct Effects Analysis Area

Source	Resource Type	Time Period	Total Number of Use Areas	Number (%) of Use Areas in Direct Effects Analysis Area
SRB&A 2010b	All resources	1995–2006	2,029	50 (3%)

In general, the direct effects analysis area is located in the northeastern periphery of Utqiaġvik's extensive subsistence use areas. Resource uses that overlap include caribou, moose, other large land mammals, furbearers and small land mammals, fish, birds, and marine mammals (Figures B.12 through B.20). Resources that overlap during a majority of study years include caribou, moose, and furbearers and small land mammals. While most resource uses overlap a smaller portion of the direct effects analysis area or overlap areas of low overlapping use, the direct effects analysis area is directly to the east of Teshekpuk Lake, which is an area of high subsistence activity for caribou, furbearers and small land mammals, and fish. In addition, the direct effects analysis area overlaps with the Colville River upriver from the community of Nuiqsut, an area used by some Utqiaġvik harvesters for moose hunting during the fall.

1.2.2.2 Harvest and Use Data

Tables B.11 through B.13 provide subsistence harvest data for Utqiaġvik. Intermittent subsistence harvest studies exist for Utqiaġvik harvests from 1987 through 2014, including 10 comprehensive (i.e., all resources) studies (Tables B.11 and B.13) (Bacon, Hepa et al. 2009; Brown, Braem et al. 2016; Fuller and George 1999; SRB&A and ISER 1993) and three single-resource studies (Table B.12) (Naves 2010). Studies show Utqiaġvik households harvesting between 204 and 362 per capita pounds of subsistence resources during available study years. Marine mammals have contributed the highest amount toward the total subsistence harvests in Utqiaġvik (at least 50% of pounds usable weight), followed by large land mammals (between 20% and 40%). Non-salmon fish and migratory birds provided a smaller, but substantial, portion of the yearly harvest during most years. While bird harvests by Utqiaġvik households appear modest in terms of pounds, residents of Utqiaġvik harvest large numbers of both migratory and upland game birds. In 2014, Utqiaġvik residents harvested an estimated 19,049 migratory birds and 911 upland game birds. The single-resource bird harvest study from the mid-to-late 2000s shows varying levels of bird and egg harvests by Utqiaġvik residents from year to year (Table B.12).

In terms of species, bowhead whales have been the most harvested resource during all but two study years (1987 and 2014), providing between 29.7% and 68.1% of the subsistence harvest (Table B.13). Caribou was the second-most harvested resource during all but two study years, accounting for between 13.3% and 30.6% of Utqiaġvik harvests. Other subsistence species that have contributed highly to Utqiaġvik subsistence harvests over the study years include seal (bearded and ringed), walrus, whitefish (especially broad whitefish), goose, ducks (primarily eiders), polar bear, Arctic grayling, and moose. The most recent comprehensive study year (2014) also showed beluga and salmon (chum and sockeye) among the top 10 species harvested. Although only accounting for a small portion of Utqiaġvik's yearly harvest, vegetation (e.g., berries and plants), marine invertebrates (e.g., clams), and eggs are also harvested by Utqiaġvik residents annually.

Table B.11. Utqiaġvik Subsistence Harvest Estimates by Resource Category, All Resources Study Years

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[a]	Estimated Harvest Total Pounds[b]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1987	All resources	–	–	58	–	–	–	621,067	663	206	100.0
1987	Salmon	–	–	3	–	–	196	1,190	1	<1	0.2
1987	Non-salmon fish	–	–	–	–	–	45,367	67,262	72	22	10.8
1987	Large land mammals	–	–	–	–	–	1,660	213,777	228	71	34.4
1987	Small land mammals	–	–	–	–	–	233	58	<1	<1	<0.1
1987	Marine mammals	–	–	41	–	–	–	316,229	337	105	50.9
1987	Migratory birds	–	–	–	–	–	8,125	20,618	22	7	3.3
1987	Upland game birds	–	–	16	–	–	2,454	1,717	2	1	0.3
1987	Vegetation	–	–	3	–	–	–	216	<1	<1	<0.1
1988	All resources	–	–	50	–	–	–	614,669	656	204	100.0
1988	Salmon	–	–	1	–	–	80	490	1	<1	0.1
1988	Non-salmon fish	–	–	14	–	–	38,005	50,571	54	17	8.2
1988	Large land mammals	–	–	27	–	–	1,599	207,005	221	69	33.7
1988	Small land mammals	–	–	–	–	–	152	0	0	0	0.0
1988	Marine mammals	–	–	39	–	–	654	334,069	357	111	54.3
1988	Migratory birds	–	–	34	–	–	7,832	21,419	23	7	3.5
1988	Upland game birds	–	–	9	–	–	1,350	945	1	<1	0.2
1988	Vegetation	–	–	2	–	–	–	169	<1	<1	<0.1
1989	All resources	–	–	61	–	–	–	872,092	931	289	100.0
1989	Salmon	–	–	10	–	–	2,088	12,244	13	4	1.4
1989	Non-salmon fish	–	–	13	–	–	66,199	106,226	113	35	12.2
1989	Large land mammals	–	–	39	–	–	1,705	214,676	229	71	24.6
1989	Small land mammals	–	–	2	–	–	68	7	<1	0	<0.1
1989	Marine mammals	–	–	45	–	–	591	508,181	542	169	58.3
1989	Migratory birds	–	–	37	–	–	12,539	29,215	31	10	3.3
1989	Upland game birds	–	–	5	–	–	329	231	<1	<1	<0.1
1989	Vegetation	–	–	–	–	–	–	1,312	1	<1	0.2
1992[c]	All resources	–	–	–	–	–	–	1,363,738	–	–	100.0
1992[c]	Salmon	–	–	–	–	–	1,161	8,236	–	–	0.6
1992[c]	Non-salmon fish	–	–	–	–	–	50,596	87,769	–	–	6.4
1992[c]	Large land mammals	–	–	–	–	–	2,033	250,447	–	–	18.4
1992[c]	Small land mammals	–	–	–	–	–	260	35	–	–	<0.1
1992[c]	Marine mammals	–	–	–	–	–	1,080	991,528	–	–	72.7
1992[c]	Migratory birds	–	37	–	–	–	10,223	22,922	–	–	1.7
1992[c]	Upland game birds	–	–	–	–	–	1,332	933	–	–	0.1

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[a]	Estimated Harvest Total Pounds[b]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1992[c]	Eggs	–	–	–	–	–	89	13	–	–	<0.1
1992[c]	Marine invertebrates	–	–	–	–	–	1,774	694	–	–	0.1
1992[c]	Vegetation	–	16	–	–	–	291	1,164	–	–	0.1
1995–1996	All resources	–	–	–	–	–	–	1,194,484	–	–	100.0
1995–1996	Salmon	–	–	–	–	–	301	1,628	–	–	0.1
1995–1996	Non-salmon fish	–	–	–	–	–	29,334	42,778	–	–	3.6
1995–1996	Large land mammals	–	–	–	–	–	2,164	294,236	–	–	24.6
1995–1996	Small land mammals	–	–	–	–	–	220	54	–	–	<0.1
1995–1996	Marine mammals	–	–	–	–	–	883	789,821	–	–	66.1
1995–1996	Migratory birds	–	–	–	–	–	14,746	61,217	–	–	5.1
1995–1996	Upland game birds	–	–	–	–	–	–	152	–	–	<0.1
1995–1996	Eggs	–	–	–	–	–	21	3	–	–	<0.1
1995–1996	Marine invertebrates	–	–	–	–	–	2,208	4,416	–	–	0.4
1995–1996	Vegetation	–	–	–	–	–	27	178	–	–	<0.1
1996–1997	All resources	–	–	–	–	–	–	1,181,132	–	–	100.0
1996–1997	Salmon	–	–	–	–	–	345	2,063	–	–	0.2
1996–1997	Non-salmon fish	–	–	–	–	–	27,469	44,964	–	–	3.8
1996–1997	Large land mammals	–	–	–	–	–	1,158	157,420	–	–	13.3
1996–1997	Small land mammals	–	–	–	–	–	157	213	–	–	<0.1
1996–1997	Marine mammals	–	–	–	–	–	486	957,692	–	–	81.1
1996–1997	Migratory birds	–	–	–	–	–	4,472	18,533	–	–	1.6
1996–1997	Upland game birds	–	–	–	–	–	–	224	–	–	<0.1
1996–1997	Vegetation	–	–	–	–	–	4	23	–	–	<0.1
2000	All resources	–	–	–	–	–	–	1,285,565	–	–	100.0
2000	Salmon	–	–	–	–	–	2,100	10,247	–	–	0.7
2000	Non-salmon fish	–	–	–	–	–	78,065	114,455	–	–	7.3
2000	Large land mammals	–	–	–	–	–	3,390	460,642	–	–	29.5
2000	Small land mammals	–	–	–	–	–	421	423	–	–	<0.1
2000	Marine mammals	–	–	–	–	–	1,491	909,927	–	–	58.3
2000	Migratory birds	–	–	–	–	–	15,647	63,826	–	–	4.1
2000	Upland game birds	–	–	–	–	–	–	1,071	–	–	0.1
2000	Eggs	–	–	–	–	–	11	3	–	–	<0.1
2000	Marine invertebrates	–	–	–	–	–	36	109	–	–	<0.1
2000	Vegetation	–	–	–	–	–	71	382	–	–	<0.1
2001	All resources	–	–	–	–	–	–	1,082,241	–	–	100.0
2001	Salmon	–	–	–	–	–	332	1,720	–	–	0.2
2001	Non-salmon fish	–	–	–	–	–	4,453	10,003	–	–	0.9
2001	Large land mammals	–	–	–	–	–	1,840	249,943	–	–	23.1

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[a]	Estimated Harvest Total Pounds[b]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
2001	Small land mammals	–	–	–	–	–	118	0	–	–	0.0
2001	Marine mammals	–	–	–	–	–	777	793,162	–	–	73.3
2001	Migratory birds	–	–	–	–	–	6,390	26,326	–	–	2.4
2001	Upland game birds	–	–	–	–	–	–	1,029	–	–	0.1
2001	Marine invertebrates	–	–	–	–	–	13	36	–	–	<0.1
2001	Vegetation	–	–	–	–	–	3	22	–	–	<0.1
2003	All resources	–	–	–	–	–	–	1,245,943	–	–	100.0
2003	Salmon	–	–	–	–	–	4,793	22,617	–	–	1.8
2003	Non-salmon fish	–	–	–	–	–	20,109	36,922	–	–	3.0
2003	Large land mammals	–	–	–	–	–	2,098	285,297	–	–	22.9
2003	Small land mammals	–	–	–	–	–	84	7	–	–	<0.1
2003	Marine mammals	–	–	–	–	–	1,551	871,568	–	–	70.0
2003	Migratory birds	–	–	–	–	–	8,119	23,349	–	–	1.9
2003	Upland game birds	–	–	–	–	–	443	438	–	–	<0.1
2003	Eggs	–	–	–	–	–	44	185	–	–	<0.1
2003	Marine invertebrates	–	–	–	–	–	1,733	5,198	–	–	0.4
2003	Vegetation	–	–	–	–	–	61	362	–	–	<0.1
2014	All resources	89	57	52	63	87	–		1214	362	100.0
2014	Salmon	69	26	24	26	55	12,087	57,262	36	11	3.0
2014	Non-salmon fish	69	29	27	37	60	106,555	196,049	124	37	10.2
2014	Large land mammals	72	39	33	39	57	4,335	595,004	376	112	30.9
2014	Small land mammals	8	6	5	2	4	1,474	0	0	0	0.0
2014	Marine mammals	71	30	18	45	70	1,792	1,020,943	645	192	53.1
2014	Migratory birds	53	32	29	29	35	19,049	48,271	31	9	2.5
2014	Upland game birds	9	9	8	4	1	911	638	0	0	<0.1
2014	Eggs	13	7	7	3	7	3,688	1,113	1	0	0.1
2014	Marine invertebrates	7	2	2	2	5	561	1,096	1	0	0.1
2014	Vegetation	43	18	16	15	35	853	2,975	2	1	0.2

Source: 1995–1996, 1996–1997, 2000, 2001, 2003 (Bacon, Hepa et al. 2009); 2014 (Brown, Braem et al. 2016); 1992 (Fuller and George 1999); 1987–1989 (SRB&A and ISER 1993).

[a] Estimated numbers represent individuals in all cases except vegetation, where they represent gallons. The estimated harvest numbers for the 1995–1996, 1996–1997, 2000, 2001, and 2003 data were derived by summing individual species in each resource category.

[b] Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers). The estimated harvest pounds for the 1995–1996, 1996–1997, 2000, 2001, and 2003 data total pounds were derived from conversion rates found at ADF&G (2018) and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in George et al. (n.d.).

[c] Household participation for the 1992 study year based on Table A5 in Fuller and George (1999); participation in migratory bird harvests includes waterfowl and eggs. Participation in vegetation harvests includes only berries.

Participation in subsistence activities by Utqiaġvik households is relatively high. Available data show at least half of Utqiaġvik households successfully harvested subsistence resources during each of the study years (Table B.11). An even higher percentage of households used subsistence resources; in 2014, 89% of Utqiaġvik households used subsistence resources. Household participation rates were particularly high in harvests of marine mammals, migratory birds, large land mammals, and non-salmon fish (Table B.11). Sharing is an important tool for maintaining social networks and distributing food throughout the community. In 2014, 87% of Utqiaġvik households received subsistence resources, and 63% gave subsistence resources away. The most commonly received resources included marine mammals, non-salmon fish, and large land mammals.

Table B.12. Utqiaġvik Subsistence Harvest Estimates by Resource Category, Non-Comprehensive Study Years

Study Year	Resource	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number	Estimated Harvest Total Pounds	Estimated Harvest Average Household Pounds	Estimated Harvest Per Capita Pounds
2005	Birds	–	–	–	–	–	10,943	–	–	–
2007	Birds	–	–	–	–	–	38,152	–	–	–
2008	Birds	–	–	–	–	–	35,250	–	–	–
2005	Eggs	–	–	–	–	–	32	–	–	–
2007	Eggs	–	–	–	–	–	1,783	–	–	–
2008	Eggs	–	–	–	–	–	204	–	–	–

Source: 2005, 2007, 2008 (Naves 2010)
Note: Estimated harvest number for birds include upland game birds and migratory birds combined.

Table B.13. Utqiaġvik Subsistence Harvest Estimates by Selected Species, All Study Years

Study Year	Resource[a]	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[b]	Estimated Harvest Total Pounds[c]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1987	Caribou	–	–	26	–	–	1,595	186,669	199	62	30.1
1987	Bowhead whale	–	–	31	–	–	7	184,629	197	61	29.7
1987	Walrus	–	–	11	–	–	84	64,663	69	21	10.4
1987	Bearded seal	–	–	25	–	–	236	41,518	44	14	6.7
1987	Broad whitefish	–	–	11	–	–	10,579	27,519	29	9	4.4
1987	Moose	–	–	6	–	–	52	25,786	28	9	4.2
1987	Ringed seal	–	–	14	–	–	466	19,574	21	6	3.2
1987	Goose	–	–	20	–	–	2,873	12,740	14	4	2.1
1987	Unknown whitefish	–	–	3	–	–	5,108	10,215	11	3	1.6
1987	Arctic grayling	–	–	14	–	–	12,664	10,131	11	3	1.6
1987	Ducks	–	–	22	–	–	5,252	7,878	8	3	1.3
1987	Least cisco	–	–	–	–	–	–	7,024	8	2	1.1
1988	Bowhead whale	–	–	35	–	–	11	233,313	249	77	38.0
1988	Caribou	–	–	27	–	–	1,533	179,314	191	59	29.2
1988	Walrus	–	–	6	–	–	61	47,215	50	16	7.7
1988	Bearded seal	–	–	11	–	–	179	31,436	34	10	5.1
1988	Broad whitefish	–	–	11	–	–	11,432	29,423	31	10	4.8
1988	Moose	–	–	4	–	–	53	26,367	28	9	4.3
1988	Ringed seal	–	–	10	–	–	388	16,304	17	5	2.7
1988	Goose	–	–	19	–	–	3,334	14,672	16	5	2.4

Study Year	Resource[a]	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[b]	Estimated Harvest Total Pounds[c]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
1988	Least cisco	–	–	2	–	–	–	7,505	8	2	1.2
1988	Arctic grayling	–	–	11	–	–	8,684	6,947	7	2	1.1
1988	Ducks	–	–	20	–	–	4,498	6,747	7	2	1.1
1989	Bowhead whale	–	–	45	–	–	10	377,647	403	125	43.3
1989	Caribou	–	–	39	–	–	1,656	193,744	207	64	22.2
1989	Broad whitefish	–	–	–	–	–	30,047	78,921	84	26	9.0
1989	Walrus	–	–	13	–	–	101	77,987	83	26	8.9
1989	Seal	–	–	11	–	–	440	33,077	35	11	3.8
1989	Moose	–	–	6	–	–	40	20,014	21	7	2.3
1989	Polar bear	–	–	4	–	–	39	19,471	21	6	2.2
1989	Bearded seal	–	–	11	–	–	109	19,152	20	6	2.2
1989	Goose	–	–	13	–	–	3,944	16,289	17	5	1.9
1989	Ringed seal	–	–	11	–	–	328	13,774	15	5	1.6
1989	Ducks	–	–	37	–	–	8,589	12,883	14	4	1.5
1989	Humpback whitefish	–	–	10	–	–	3,648	9,119	10	3	1.0
1992[d]	Bowhead whale	–	–	–	–	–	22	729,952	–	–	53.5
1992[d]	Caribou	–	46	–	–	–	1,993	233,206	–	–	17.1
1992[d]	Walrus	–	26	–	–	–	206	159,236	–	–	11.7
1992[d]	Bearded seal	–	–	–	–	–	463	81,471	–	–	6.0
1992[d]	Broad whitefish	–	–	–	–	–	23,997	59,993	–	–	4.4
1992[d]	Moose	–	–	–	–	–	34	17,115	–	–	1.3
1995–1996	Bowhead whale	–	–	–	–	–	16	525,413	–	–	44.0
1995–1996	Caribou	–	–	–	–	–	2,155	293,094	–	–	24.5
1995–1996	Bearded seal	–	–	–	–	–	431	181,146	–	–	15.2
1995–1996	Walrus	–	–	–	–	–	74	51,520	–	–	4.3
1995–1996	Ducks	–	–	–	–	–	12,118	50,200	–	–	4.2
1995–1996	Ringed seal	–	–	–	–	–	345	25,530	–	–	2.1
1995–1996	Broad whitefish	–	–	–	–	–	5,130	13,337	–	–	1.1
1995–1996	Whitefish	–	–	–	–	–	6,005	12,610	–	–	1.1
1996–1997	Bowhead whale	–	–	–	–	–	28	803,891	–	–	68.1
1996–1997	Caribou	–	–	–	–	–	1,158	157,420	–	–	13.3
1996–1997	Bearded seal	–	–	–	–	–	192	80,766	–	–	6.8
1996–1997	Walrus	–	–	–	–	–	78	54,320	–	–	4.6
1996–1997	Broad whitefish	–	–	–	–	–	6,684	22,726	–	–	1.9
1996–1997	Least cisco	–	–	–	–	–	–	16,519	–	–	1.4
1996–1997	Ringed seal	–	–	–	–	–	180	13,298	–	–	1.1
2000	Bowhead whale	–	–	–	–	–	18	472,651	–	–	30.3
2000	Caribou	–	–	–	–	–	3,359	456,851	–	–	29.3
2000	Bearded seal	–	–	–	–	–	729	306,012	–	–	19.6
2000	Walrus	–	–	–	–	–	115	80,710	–	–	5.2
2000	Broad whitefish	–	–	–	–	–	21,318	72,480	–	–	4.6
2000	Ringed seal	–	–	–	–	–	586	43,334	–	–	2.8
2000	Goose	–	–	–	–	–	7,818	32,564	–	–	2.1
2000	Ducks	–	–	–	–	–	7,827	31,257	–	–	2.0
2001	Bowhead whale	–	–	–	–	–	27	545,558	–	–	50.4
2001	Caribou	–	–	–	–	–	1,820	247,520	–	–	22.9
2001	Bearded seal	–	–	–	–	–	327	137,340	–	–	12.7
2001	Walrus	–	–	–	–	–	123	86,380	–	–	8.0
2001	Ringed seal	–	–	–	–	–	287	21,216	–	–	2.0
2001	Goose	–	–	–	–	–	4,146	17,214	–	–	1.6

Study Year	Resource[a]	Percent of Households Use	Percent of Households Try to Harvest	Percent of Households Harvest	Percent of Households Give	Percent of Households Receive	Estimated Harvest Number[b]	Estimated Harvest Total Pounds[c]	Estimated Harvest Average HH Pounds	Estimated Harvest Per Capita Pounds	Percent of Total Harvest
2003	Bowhead whale	–	–	–	–	–	16	476,693	–	–	38.3
2003	Bearded seal	–	–	–	–	–	776	325,962	–	–	26.2
2003	Caribou	–	–	–	–	–	2,092	284,444	–	–	22.8
2003	Ringed seal	–	–	–	–	–	413	30,525	–	–	2.4
2003	Walrus	–	–	–	–	–	313	29,380	–	–	2.4
2003	Broad whitefish	–	–	–	–	–	8,207	27,905	–	–	2.2
2003	Goose	–	–	–	–	–	3,629	14,369	–	–	1.2
2014	Caribou	70	38	33	38	52	4,323	587,897	371	111	30.6
2014	Bowhead	70	24	12	43	67	18	546,085	345	103	28.4
2014	Bearded seal	44	22	15	27	32	1,070	306,097	193	58	15.9
2014	Broad whitefish	54	22	20	29	40	43,962	140,679	89	26	7.3
2014	Walrus	31	11	4	17	27	135	103,602	65	19	5.4
2014	Goose	46	26	24	22	29	35,642	35,642	23	7	1.9
2014	Ringed seal	19	10	8	11	11	428	24,402	15	5	1.3
2014	Beluga	15	4	0	9	14	25	24,341	15	5	1.3
2014	Chum salmon	24	13	11	10	15	4,039	24,312	15	5	1.3
2014	Sockeye salmon	29	9	9	11	23	4,630	18,667	12	4	1.0

Source: 1995–1996, 1996–1997, 2000, 2001, 2003 (Bacon, Hepa et al. 2009); 1995–1996, 1996–1997, 2000, 2001, 2003 (Brown, Braem et al. 2016); 1992 (Fuller and George 1999); 1987, 1988, 1999 (SRB&A and ISER 1993).

[a] Except in the case of ducks and goose, which are lumped into more general species categories, this table shows individual species unless they are not available for a given study year. For all resources study years (1987, 1988, 1989, 1992, 1995–1996, 1996–1997, 2000, 2001, 2003) species are listed in descending order by percent of total harvest and are limited to species accounting for at least 1.0% of the total harvest; for single-resource study years, species are listed in descending order by total estimated pounds (or total number harvested, in the case of salmon study years) and limited to the five top species. Years lacking "% of total harvest" data were not comprehensive (i.e., all resources) study years.

[b] Estimated numbers represent individuals in all cases except vegetation, where they represent gallons. The estimated harvest numbers for the 1995–1996, 1996–1997, 2000, 2001, and 2003 data were derived by summing individual species in each resource category.

[c] Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers). The estimated harvest pounds for the 1995–1996, 1996–1997, 2000, 2001, and 2003 data for total pounds were derived from conversion rates found at ADF&G (2018), and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in George et al. (n.d.).

[d] Household participation for the 1992 study year based on Table A5 in Fuller and George (1999).

1.2.2.2.1 Direct Effects Analysis Area

Utqiaġvik harvesters primarily use the direct effects analysis area to hunt for wolf, wolverine, moose, and caribou; a small number of Utqiaġvik harvesters have reported using the area for harvests of seal and goose. As shown in Table B.13, caribou are among the top species harvested, in terms of edible weight, by the community of Utqiaġvik. During the most recent study year (2014), over one-third (38%) of Utqiaġvik households participated in the hunting of caribou (the percentage would likely be higher among Native households only). Moose harvests have accounted for up to 4% of the harvest in some years; however, in recent years these harvests have contributed less than 1%. Similar to Nuiqsut, wolf and wolverine hunting is practiced by a smaller proportion of households; 6% of households participated in harvest of small land mammals in 2014 (Table B.11; again, this percentage was likely higher among Native households). However, furbearer hunting and associated income and activities are an important component of Iñupiaq culture, and Utqiaġvik furbearer harvesters often expend substantial time, money, and effort in their pursuits. Data on harvest amounts specific to the direct effects analysis area are not available for Utqiaġvik.

Based on data from SRB&A (2010b), which collected subsistence use areas for key resources for the 1997–2006 time period, the direct effects analysis area is used by moose hunters (44% of harvesters), wolf and wolverine hunters (29% of harvesters), and caribou hunters (26% of harvesters) (Table B.14). The Colville River drainage is a primary moose hunting area on the North Slope, and some Utqiaġvik

residents will travel to the Nuiqsut area by plane or boat to access these harvesting areas. A small number of individuals have reported traveling to the direct effects analysis area for harvesting of bearded seal, ringed seal, and goose (2% of harvesters or less). For resources as a whole, approximately one-quarter (31%) of Utqiaġvik harvesters reported using the direct effects analysis area for subsistence purposes during the 1997–2006 time period (Table B.14).

Table B.14. Utqiaġvik Harvesters Using the Direct Effects Analysis Area, 1997–2006

Resource Category	Total Number of Respondents for Resource	Number of Respondents in Direct Effects Analysis Area	Percent of Utqiaġvik Resource Respondents
Wolverine	31	9	29%
Wolf	31	9	29%
Caribou	73	19	26%
Moose	9	4	44%
Bearded seal	63	1	2%
Ringed seal	48	1	2%
Goose	71	1	1%
All resources	**75**	**23**	**31%**

Source: SRB&A 2010b

1.2.2.3 Timing of Subsistence Activities

Table B.15 provides data on the timing of Utqiaġvik subsistence activities, based on reports from the 1980s through the 2010s. Overall, Utqiaġvik harvesters target the greatest number of resources in the months of August and September. These months are a primary time for harvests of non-salmon fish, salmon, caribou, moose and other large land mammals, marine mammals, and plants and berries.

Table B.15. Utqiaġvik Annual Cycle of Subsistence Activities

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon	L	L	L	L	M	M	H	H	H	H	M	L
Marine non-salmon	L	L	L	–	–	L	M	H	H	M	L	–
Salmon	–	–	–	–	L	L	H	H	M	L	–	–
Caribou	L	L	L	L	L	L	H	H	H	H	L	L
Moose	–	L	L	M	M	M	M	H	H	–	–	–
Bear	–	–	–	L	L	L	L	M	H	L	–	–
Dall sheep	–	–	H	–	–	–	–	L	–	–	–	–
Muskox	–	–	H	–	–	–	–	–	H	–	–	–
Furbearers	H	H	H	M	L	L	–	–	L	M	H	H
Small land mammals	–	L	L	H	H	L	M	L	M	L	L	–
Marine mammals	L	L	L	M	M	M	H	H	H	M	M	L
Upland birds	L	L	L	M	H	M	L	L	L	L	L	L
Waterfowl	L	L	L	M	H	M	L	L	L	L	L	L
Marine invertebrates	–	–	–	–	–	M	L	M	H	L	L	–
Plants and berries	–	–	–	–	L	L	L	H	M	–	–	–
Total number of resource categories by month	**7**	**9**	**11**	**9**	**11**	**13**	**12**	**13**	**14**	**11**	**9**	**6**

Source: (Bacon, Hepa et al. 2009; Braem, Kaleak et al. 2011; Brown, Braem et al. 2016; EDAW Inc., Adams/Russel Consulting et al. 2008; Schneider, Pedersen et al. 1980; SRB&A 2010b; SRB&A and ISER 1993)
Note: "–" (no documented activity and/or harvests); H (high activity and/or harvests); L (limited activity and/or harvests); M (moderate activity and/or harvests)

The spring subsistence season (April and May) in Utqiaġvik is primarily dedicated to hunting bowhead whales with some additional harvests of other marine mammals including seals and polar bears. Hunting of waterfowl such as eiders and white-fronted goose begins during these spring months (Brown, Braem et al. 2016) and, particularly for eiders, continues into the summer months. Harvests of goose peak in May, and eider hunting occurs offshore during the spring whaling season (generally when leads are closed and whaling crews are not actively hunting whales).

The summer months (June–August) are a time of diversified subsistence activity when residents travel into the ocean and along various river systems in pursuit of marine, terrestrial, and riverine resources. A primary focus during the summer and fall months is hunting marine mammals (e.g., bearded and ringed

seals, walruses) offshore as they migrate north with the floe ice, with eiders often a secondary target. Residents travel along the coast and inland during the summer months to hunt caribou and harvest a variety of fish in lagoons and rivers. The peak caribou hunting season is in July and August when they are available to hunters traveling by boat along the coast and local waterways. Residents also harvest berries and other vegetation during these boating trips.

The fall bowhead whale hunt is a major focus during the months of September and October. In addition, caribou, fish, and birds remain sought-after resources throughout the fall. During August and September, some Utqiaġvik residents may travel to the Colville River to harvest moose and berries (Brown, Braem et al. 2016; Fuller and George 1999). Bacon et al. (2009) and SRB&A (2010b) also show some eider duck harvesting continuing into these fall months. The subsistence fish harvest generally peaks in October (under-ice fishery) when whitefish and Arctic grayling are concentrated at over-wintering areas. Winter months (November–March) are primarily spent hunting and trapping furbearers, in addition to harvesting caribou, ringed seals, upland birds (ptarmigan), the occasional polar bear, and fish.

1.2.2.3.1 Direct Effects Analysis Area

Utqiaġvik harvesters use the direct effects analysis area at varying levels throughout the year (Figure B.21). For resources as a whole for the 1997–2006 time period, use of the direct effects analysis area is highest in the winter months of February and March, with lower levels occurring throughout the rest of the year. Caribou hunting in the direct effects analysis area peaks both during the winter (February and March) and summer (July and August). Moose hunting occurs solely in the months of August and September. Wolf and wolverine hunters use the direct effects analysis area solely during the winter months of November through April, with a peak in February and March, when snow conditions allow for extensive overland travel and furs are prime. The limited seal and goose hunting reported by Utqiaġvik harvesters occur primarily during the spring (April and May for seal; May and June for goose).

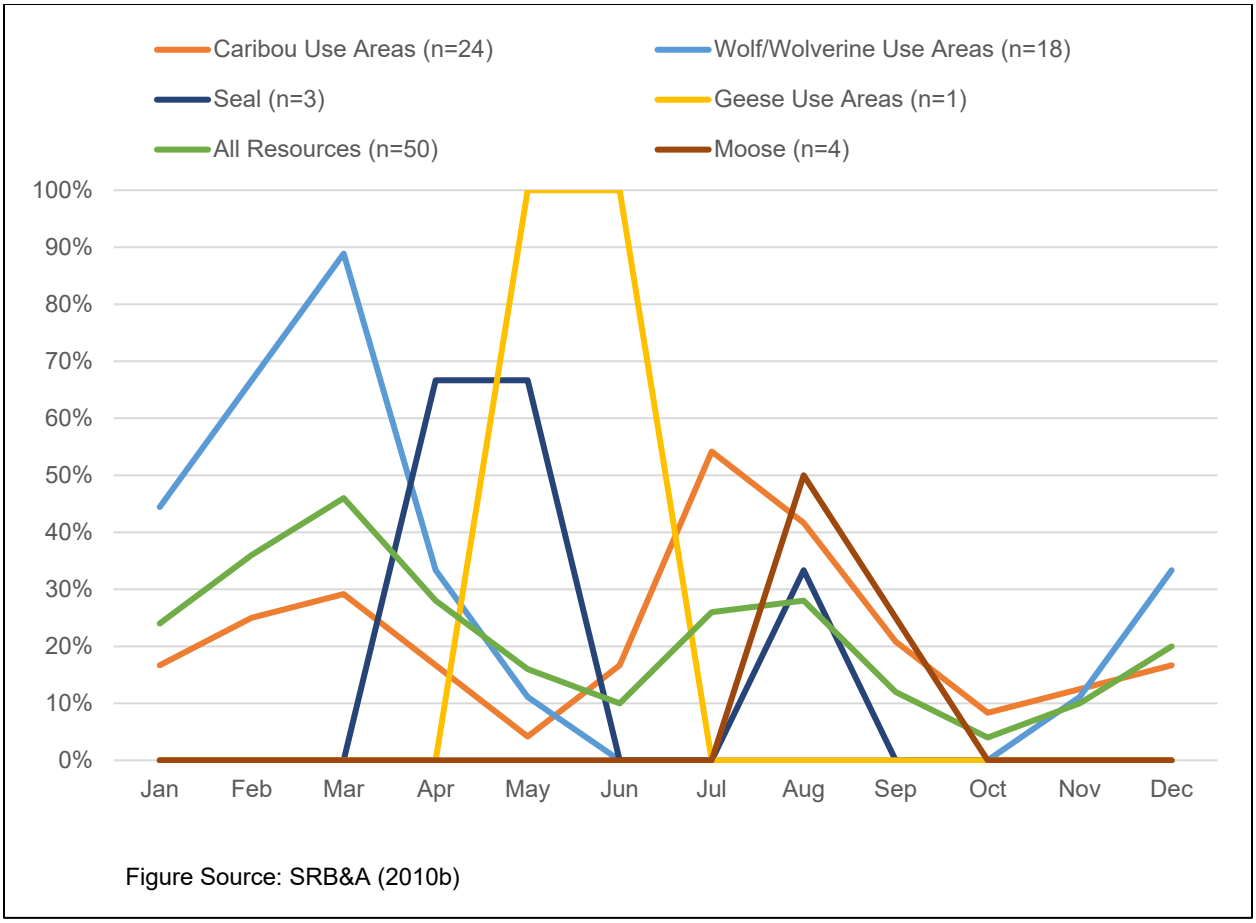


Figure B.21. Utqiaġvik Subsistence Use Areas by Month in Direct Effects Analysis Area, by Resource

1.2.2.4 Travel Methods

Table B.16 shows primary travel methods used for key species as documented in SRB&A (2010b). Boat is the primary method of travel used by Utqiaġvik residents for subsistence pursuits of certain non-salmon fish, caribou, bowhead whale, seals, walrus, and eider. Snow machine is the primary method for late fall and winter pursuits of Arctic cisco, burbot, moose, wolf, wolverine, and goose. To a lesser extent, Utqiaġvik residents also travel by foot, car/truck, ATV, and plane to access subsistence use areas.

Table B.16. Utqiaġvik Travel Method to Subsistence Use Areas

Resources	Boat	Snow Machine	Foot	Car/Truck	ATV	Plane
Arctic cisco and burbot	M	H	–	L	L	M
Arctic char/Dolly Varden and broad whitefish	H	M	–	M	M	L
Caribou	H	M	L	L	M	L
Moose	M	H	–	–	–	–
Wolf and wolverine	–	H	–	–	–	–
Bowhead whale	H	M	–	–	–	–
Seals	H	M	–	–	–	–
Walrus	H	L	–	–	–	–
Goose	M	H	L	L	M	L
Eider	H	M	L	M	L	–

Source: 1996–2007 (SRB&A 2010b)
Note: "–" (no documented use of travel method); ATV (all-terrain vehicle); H (high use of travel method); L (limited use of travel method); M (moderate use of travel method)

1.2.2.4.1 Direct Effects Analysis Area

As shown in Figure B.22, for the 1997–2006 time period, snow machine was the primary method used to access the direct effects analysis area (60% of use areas), followed by boat (42%). Snow machine/overland travel generally occurs between November and April (Figure B.21), whereas coastal and riverine boat travel generally occurs from June through September.

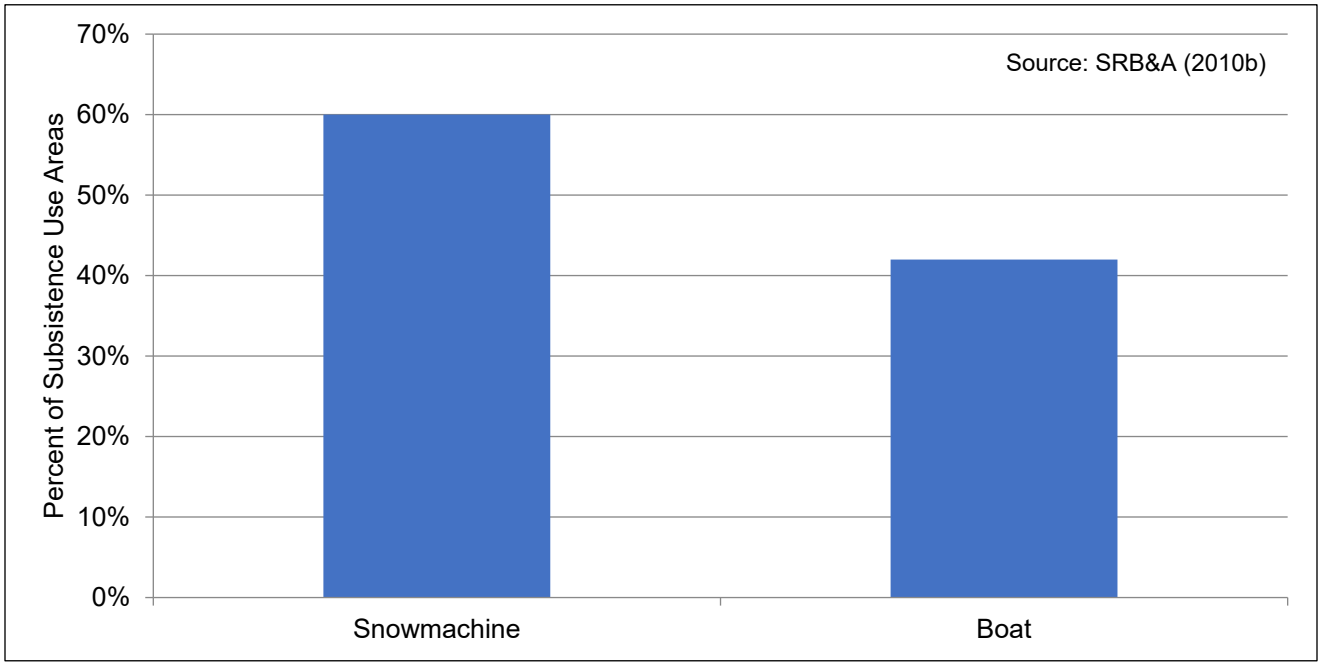


Figure B.22. Utqiaġvik Travel Methods, Direct Effects Analysis Area

1.2.2.5 Resource Importance

An analysis of resource importance for Utqiaġvik based on harvest (percent of total harvest), harvest effort (percentage of households trying to harvests) and sharing (percent of households receiving) variables is provided in Table B.17. Based on this analysis, resources of major importance in Utqiaġvik are bearded seal, bowhead whale, and caribou.

Table B.17. Relative Importance of Subsistence Resources Based on Selected Variables, Utqiaġvik

Resource Importance	Resource[a]	Average Percent of Total Harvest	Percent of Households Trying to Harvest	Percent of Households Receiving
Major resources[b]	Bearded seal	12	22	32
Major resources[b]	Bowhead whale	42	24	67
Major resources[b]	Caribou	24	53	68
Moderate resources[c]	Arctic cisco	<1	5	33
Moderate resources[c]	Arctic grayling	1	13	17
Moderate resources[c]	Beluga	<1	4	14
Moderate resources[c]	Blueberry	<1	4	14
Moderate resources[c]	Broad whitefish	4	22	40
Moderate resources[c]	Chinook/king salmon	<1	5	12
Moderate resources[c]	Chum/dog salmon	<1	13	15
Moderate resources[c]	Coho/silver salmon	<1	9	20
Moderate resources[c]	King eider	<1	16	14
Moderate resources[c]	Moose	2	2	13
Moderate resources[c]	Pink/humpback salmon	<1	9	12
Moderate resources[c]	Rainbow smelt	<1	2	18
Moderate resources[c]	Ringed seal	2	10	11
Moderate resources[c]	Salmonberry/cloudberry	<1	12	30

Resource Importance	Resource[a]	Average Percent of Total Harvest	Percent of Households Trying to Harvest	Percent of Households Receiving
Moderate resources[c]	Sockeye salmon	1	9	23
Moderate resources[c]	Walrus	7	19	27
Moderate resources[c]	White-fronted goose	1	23	22
Minor resources[d]	Common eider	<1	9	9
Minor resources[d]	Halibut	<1	3	8
Minor resources[d]	Humpback whitefish	<1	7	5
Minor resources[d]	Least cisco	1	6	7
Minor resources[d]	Other birds	<1	9	1
Minor resources[d]	Polar bear	1	2	6
Minor resources[d]	Ptarmigan	<1	9	1
Minor resources[d]	Sheefish	–	–	6
Minor resources[d]	Snow goose	<1	5	2
Minor resources[d]	Wolf	<1	<5	<5
Minor resources[d]	Wolverine	<1	<5	<5

Source: 1995 to 1996, 1996 to 1997, 2000, 2001, 2003 (Bacon, Hepa et al. 2009); 2014 (Brown, Braem et al. 2016); 1992 (Fuller and George 1999); 1987 to 1989 (SRB&A and ISER 1993).
Note: "–" (resource was not harvested, or no households attempted to harvest resource)
[a] For space considerations, resources that contributed an average of less than 1% of harvest, less than 5% attempting harvests, and less than 5% receiving harvests are categorized as minor and are not be shown
[b] Major resources contribute >9% total harvest, have ≥50% of households attempting harvest, or have ≥50% of households receiving resource.
[c] Moderate resources contribute 2% to 9% of total harvest, have 11% to 49% of households attempting harvest, or have 11% to 49% of households receiving resource.
[d] Minor resources contribute <2% of total harvest, have ≤10% of households attempting harvest, or have ≤10% of households receiving resource. For space considerations, resources contributing an average of less than 1% of harvest, less than 5% attempting harvests, or less than 5% receiving harvests are categorized as minor and may not be shown. While wolf and wolverine fall below the threshold for inclusion (less than 1% of material importance, and less than 5% for cultural importance), they are included because of their relevance to the study areas.

2.0 COMPARISON OF ACTION ALTERNATIVES AND OPTIONS

Tables B.18 and B.19 summarize and compare impacts to subsistence use areas among the action alternatives and module delivery options.

Table B.18. Comparison of Impacts to Subsistence Uses for Nuiqsut

Effects To	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Resources (Importance)	Caribou (Major) Furbearers (Minor)[a] Waterfowl (Major) Fish (Major)	Same as Alternative B	Same as Alternative B	Caribou (Major) Furbearers (Minor)[a] Waterfowl (Major) Seals (Major)	Caribou (Major) Furbearers (Minor)[a] Waterfowl (Major)	Caribou (Major) Furbearers (Minor) Waterfowl (Major)
Resource Abundance	No impacts to overall abundance expected	Same as Alternative B	Same as Alternative B	No impacts to overall abundance expected	Same as Option 1	Same as Option 1
Resource Availability	Caribou: Greatest potential for impacts to resource availability Furbearers: High likelihood of reduced furbearer availability near the Project Waterfowl, fish: Low likelihood as Project does not overlap with areas of high overlapping subsistence use and large-scale contamination events are unlikely	Caribou: Impacts to caribou resource availability reduced from Alt B. Increase in air traffic impacts would be offset by decreased infrastructure and potential for deflection. Furbearers, waterfowl, fish: Same as Alternative B	Caribou: Least potential for impacts to resource availability. Increase in air traffic impacts would be offset by decreased infrastructure and potential for deflection. Furbearers, waterfowl, fish: See Alternative B	Caribou: Impacts minimal due to winter timing of activities Furbearers: High likelihood of reduced availability near ice roads Waterfowl: Moderate likelihood of reduced availability during one spring hunting season Seals: Moderate likelihood of reduced availability to individual hunters during multiple summers	Caribou: Impacts minimal due to winter timing of activities Furbearers: High likelihood of reduced furbearer availability near ice roads Waterfowl: Moderate likelihood of reduced waterfowl during one spring hunting season	Caribou: Impacts minimal due to winter timing of activities Furbearers: Moderate likelihood of reduced furbearer availability near ice roads during two hunting seasons Waterfowl: Moderate likelihood of reduced availability during two spring hunting seasons
Harvester Access	High likelihood of impacts during construction phase due to lack of ice road access on gravel haul and module transport ice roads near the community and barriers to overland travel due to high traffic levels. Moderate likelihood of impacts during operation due to physical obstructions and safety considerations while hunting along roads. Moderate likelihood of increased access although use of roads may decrease with distance from the community.	Same as Alternative B	High likelihood of impacts during construction phase due to lack of ice road access on gravel haul and module transport ice roads near the community and barriers to overland travel due to high traffic levels. Lower likelihood of impacts to access during operation due to fewer physical obstructions to access. Impacts related to safety considerations would remain. Low likelihood of increased access although use of roads may decrease with distance from the community.	Caribou, furbearers, waterfowl: High likelihood of impacts during construction phase due to lack of ice road access on gravel haul and module transport ice roads near the community and barriers to overland travel due to high traffic levels. Seals: Low to moderate likelihood of impacts as MTI is on periphery of hunting area General: Low likelihood of changes to access in nearshore/coastal areas due to erosion/sedimentation	Caribou, furbearers, waterfowl: High likelihood of impacts during construction phase due to lack of ice road access on gravel haul and module transport ice roads near the community and barriers to overland travel due to high traffic levels.	Caribou, furbearers: Moderate likelihood of impacts during construction phase due to lack of ice road access on module transport ice roads in high-use winter hunting areas and potential barriers to overland travel.

Effects To	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Community-Level Impacts	Impacts are most likely to occur for Nuiqsut harvesters (up to 88% directly affected).	Same as Alternative B	Same as Alternative B	Impacts are most likely to occur for Nuiqsut harvesters (up to 94% directly affected).	Impacts are most likely to occur for Nuiqsut harvesters (up to 94% directly affected).	Impacts are most likely to occur for Nuiqsut harvesters (up to 97% directly affected)

[a] Despite being characterized as a resource of minor importance based on selected measures, furbearer hunting and trapping is a specialized activity with unique importance to the study communities.

Table B.19. Comparison of Impacts to Subsistence Uses for Utqiaġvik

Effects To	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Resources (Importance)	Caribou (Major) Furbearers (Minor)[a]	Same as Alternative B	Same as Alternative B	Caribou (Major) Furbearers (Minor)[a]	Same as Option 1	Same as Option 1
Resource Abundance	No impacts to overall abundance expected	Same as Alternative B	Same as Alternative B	No impacts to overall abundance expected	Same as Option 1	Same as Option 1
Resource Availability	Caribou: Low potential for impacts to resource availability Furbearers: Low to moderate likelihood of reduced availability as Project does not overlap with areas of high overlapping subsistence use but occurs to the east of moderate overlapping use	Same as Alternative B	Same as Alternative B	Caribou: Low potential for impacts to resource availability Furbearers: Low to moderate likelihood of reduced availability as Project does not overlap with areas of high overlapping subsistence use but occurs to the east of moderate overlapping use	Furbearers and caribou: Low to moderate likelihood of reduced availability as high-volume ice roads would occur directly to the east of high overlapping use to the south of Teshekpuk Lake	Caribou and furbearers: Low potential for impacts to resource availability due to location of ice road in periphery of community use areas
Harvester Access	Low likelihood of reduced access as Project does not overlap with areas of high overlapping subsistence use Low likelihood of increased access	Same as Alternative B	Same as Alternative B	Low likelihood of reduced access as Project does not overlap with areas of high overlapping subsistence use	Same as Option 1	Same as Option 1
Community-Level Impacts	Impacts may occur for Utqiagvik but are less likely (up to 11% directly affected).	Same as Alternative B	Same as Alternative B	Impacts may occur for Utqiagvik but are less likely (up to 12% directly affected).	Impacts are more likely to occur for Utqiagvik harvesters under Option 2 (up to 24% of harvesters) compared to Option 1 (up to 12%). In addition, the Point Lonely option is more likely to cause indirect impacts to Utqiagvik harvesters than Option 1 because of its proximity to key Utqiagvik harvesting areas at Teshekpuk Lake.	Impacts could affect a higher percentage of Utqiagivk harvesters under Option 3 (16% of harvesters) compared to Option 1 (11% of harvesters) but would be less likely because of the greater distance of ice road infrastructure from the community.

[a] Despite being characterized as a resource of minor importance based on selected measures, furbearer hunting and trapping is a specialized activity with unique importance to the study communities.

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Willow Master Development Plan

Supplement to the Draft Environmental Impact Statement

Appendix C
Preliminary Alaska National Interest Lands Conservation Act 810 Analysis

March 2020

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List of Acronyms and Abbreviations

ANILCA	Alaska National Interest Lands Conservation Act
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practices
BT1	drill site BT1
BT2	drill site BT2
BT3	drill site BT3
BT4	drill site BT4
BT5	drill site BT5
BTU	Bear Tooth Unit
CAH	Central Arctic Caribou Herd
CPAI	ConocoPhillips Alaska, Inc.
CRD	Colville River Delta
DMTS	DeLong Mountain Transportation System
EIS	Environmental Impact Statement
GMT	Greater Mooses Tooth
GMT-1	Greater Mooses Tooth 1
GMT-2	Greater Mooses Tooth 2
IAP/EIS	Integrated Activity Plan/Environmental Impact Statement
Kuukpik	Kuukpik Corporation
MTI	module transfer island
NPR-A	National Petroleum Reserve in Alaska
Project	Willow MDP Project
ROD	Record of Decision
SDEIS	Supplement to the Draft EIS
TCH	Teshekpuk Caribou Herd
Willow MDP	Willow Master Development Plan
WOC	Willow Operations Center
WPF	Willow Processing Facility

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PRELIMINARY ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT SECTION 810 ANALYSIS OF SUBSISTENCE IMPACTS

This analysis of subsistence impacts is for the Willow Master Development Plan (Willow MDP) Draft Environmental Impact Statement (EIS), as supplemented by the Supplement to the Draft EIS (SDEIS), which contains additional analysis for three Willow MDP Project (Project) components that have been added by the Project proponent: module delivery Option 3 (Colville River Crossing), a constructed freshwater reservoir, and up to three boat ramps intended to provide subsistence access.. ConocoPhillips Alaska, Inc. (CPAI) is seeking approval to develop and produce oil from leases in the Bear Tooth Unit (BTU) of the National Petroleum Reserve in Alaska (NPR-A) via five drill sites and pipelines that would connect to the Greater Mooses Tooth 2 (GMT-2) development (currently under construction) and existing Alpine development facilities in the Colville River Delta (CRD). The Project would include its own processing facility, an operations center, ice and gravel roads, and either one or two airstrips depending on the selected alternative. The Project would be located on the North Slope of Alaska in the northeast section of the NPR-A, west of the Colville River, CRD, and the community of Nuiqsut; however, module delivery facilities and related ice roads would also be located to the east and south of Nuiqsut, including a crossing of the Colville River.

The proposed Project drill sites and the majority of operational infrastructure would be located on federal lands in the NPR-A managed by the Bureau of Land Management (BLM). Some supporting infrastructure (e.g., portions of the gravel access road, temporary ice roads, and pipelines) would be located on lands owned by the Kuukpik Corporation (Kuukpik) and the State of Alaska. Conveyed and selected Native (Kuukpik) lands would include portions of Project pipelines, roads, and Colville River pipeline crossing pads. State of Alaska lands would include portions of Project pipelines. Two of the three Willow MDP EIS alternatives analyzed include a gravel road connection from the GMT-2 drill site to the Project area. All of the action alternatives include a pipeline that would connect Project drill sites to existing pipeline infrastructure to the east.

The Willow MDP Draft EIS and SDEIS together considers three alternatives and three module delivery options, in addition to a No Action Alternative (Alternative A). While the Willow MDP Draft EIS and SDEIS analyses provide an evaluation for the three Willow MDP EIS action alternatives and three module delivery options separately, any final subsistence determinations should consider the implementation of alternatives in combination with each of the module delivery options because one of the three options would occur under any action alternative. The three Willow MDP action alternatives include the Proponent's Project (Alternative B), which includes a gravel access road connecting the Project to the existing GMT-2 and Alpine developments; Disconnected Infield Roads (Alternative C), which reduces the gravel footprint but maintains a year-round gravel road connection to the existing GMT-2 and Alpine developments; and Disconnected Access (Alternative D), which does not include a year-round gravel access road connection to the existing GMT-2 and Alpine developments. The three module delivery option alternatives include the Atigaru Point Module Transfer Island (MTI) (Option 1); the Point Lonely Module Transfer Island (Option 2); and the Colville River Crossing (Option 3). Each of these options would construct ice road connections to the Project area, and two of the options (Options 1 and 2) would construct a man-made island to support gravel hauling and module transport. Either MTI would be located in State of Alaska waters, while other associated infrastructure (e.g., ice roads, ice pads) would be located on federal lands in the NPR-A.

Chapter 3.0, *Affected Environment and Environmental Consequences*, of the Willow MDP Draft EIS and SDEIS describes the current environmental status of the Project area and potential effects of the alternative development scenarios to the physical, biological, and social environment. In particular, Section 3.16, *Subsistence and Sociocultural Systems*, addresses the affected environment and environmental consequences for subsistence, traditional use, and sociocultural systems. Other relevant

sections include Section 3.10, *Fish*; Section 3.11, *Birds*; Section 3.12, *Terrestrial Mammals*; Section 3.13, *Marine Mammals*; and Section 3.18, *Public Health*. This analysis uses that information to evaluate potential impacts to subsistence uses and needs pursuant to Section 810(a) of the Alaska National Interest Lands Conservation Act (ANILCA). This analysis is organized to inform the BLM's findings of significance based on the factors listed below (Section A). While the Willow MDP Draft EIS provides both a description of the affected environment and an analysis of the environmental consequences of the Project, this document provides an evaluation of the potential impacts of the Project on subsistence uses and needs, followed by the BLM's findings of significance for each Project alternative and the cumulative case.

A. SUBSISTENCE EVALUATION FACTORS

Section 810(a) of ANILCA, 16 USC 3120(a), requires that an evaluation of subsistence uses and needs must be completed for any federal determination to "withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands." All of the Project's proposed drill sites, Willow Processing Facility (WPF), Willow Operations Center (WOC), gravel roads, air strip(s), and sections of associated pipelines and ice roads would be located on BLM-managed public lands under all action alternatives. Thus, an evaluation of potential impacts to subsistence under ANILCA Section 810(a) must be completed for the Willow MDP EIS. All impacts to subsistence uses and needs are evaluated herein regardless of land status.

ANILCA requires that this evaluation include findings on three specific issues:

1. The effect of use, occupancy, or disposition on subsistence uses and needs.
2. The availability of other lands for the purposes sought to be achieved.
3. Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes (16 USC Section 3120(a)).

Following BLM Alaska guidance (BLM IM No. AK-2011-008), three factors are considered when determining if a significant restriction of subsistence uses and needs may result from the proposed action and alternatives, or in the cumulative case:

1. Reductions in the abundance of subsistence resources caused by a decline in the population or amount of harvestable resources.
2. Reductions in the availability of resources used for subsistence purposes caused by alteration of their normal locations, migration, and distribution patterns.
3. Limitations on access to subsistence resources, including from increased competition for the resources.

Willow MDP Draft EIS Section 3.16.1, *Affected Environment*, and Appendix E.16, *Subsistence Technical Appendix*, provide information on areas and resources important for subsistence use, and the degree of dependence of Nuiqsut and Utqiaġvik (Barrow) on different subsistence populations. The Willow MDP Draft EIS and SDEIS Section 3.16.2, *Environmental Consequences*, provides data on subsistence resource availability and limitations that each action alternative would place on access and is used to determine whether the action alternatives may cause a significant restriction to subsistence uses.

A finding that the proposed action may significantly restrict subsistence uses imposes requirements to notify the State of Alaska and appropriate regional and local subsistence committees, hold hearings in affected communities, and make the following determinations before BLM can authorize the use of public lands:

- Such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the use of the public lands.

- The proposed activity would involve the minimal amount of public lands necessary to accomplish the purposes of the use, occupancy, or other disposition.
- Reasonable steps would be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions (16 USC 3120(a)).

A proposed action or alternative would be considered to significantly restrict subsistence uses if, after consideration of stipulations or protection measures (e.g., lease stipulations and best management practices [BMPs]) included as a part of each alternative, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Substantial reductions in the opportunity to continue subsistence uses generally are caused by large reductions in resource abundance, a major redistribution of resources, extensive interference with access, or major increases in the use of those resources by non-subsistence users (BLM IM AK-2011-008).

When analyzing the effects of Project alternatives, particular attention is paid to Nuiqsut, the community that has the potential to be most directly impacted by the Project. Nuiqsut is located on the Niġliq Channel of the Colville River, and the Project area lies within a substantial portion of the community's subsistence use area (Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*, Figure 3.16.1). Additionally, the analysis considers potential effects to Utqiaġvik because the Project would be in the eastern portion of the community's subsistence use area and some components would be close to Teshekpuk Lake, a key traditional use area for the community. The cumulative analysis expands the evaluation of potential impacts to consider areas beyond the Project area in which past activities have impacted North Slope subsistence uses, in which current activities are impacting North Slope subsistence uses, or in which future activities could occur that could impact Nuiqsut, Utqiaġvik, or other North Slope communities' subsistence uses or the subsistence resources that rely upon the habitats affected.

In addition to ANILCA, Environmental Justice, as defined in Executive Order 12898, also calls for an analysis of the effects of federal actions on minority populations with regard to subsistence. Specifically, Environmental Justice is:

> *The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.*

Section 4-4 of the Executive Order on Environmental Justice, regarding the Subsistence Consumption of Fish and Wildlife, requires federal agencies to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish or wildlife for subsistence, and to communicate to the public any risks associated with those consumption patterns. To this end, the action alternatives subsistence analyses, located in Section 3.16 of the Willow MDP Draft EIS, have been reviewed and found to comply with Executive Order 12898.

B. ANILCA SECTION 810(A) EVALUATIONS AND FINDINGS FOR ALL ALTERNATIVES AND THE CUMULATIVE CASE

Evaluations and findings for Alternatives A, B, C, and D, module delivery Options 1, 2, and 3, and the cumulative case are presented individually in the following sections. BMPs established by the 2012 NPR-A Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) Record of Decision (ROD) (BLM 2013) would apply to all Project alternatives. CPAI's leases in the BTU are subject to lease stipulations established in the 2008 Northeast NPR-A Supplemental IAP ROD (BLM 2008). The mitigating effects of these BMPs and lease stipulations are accounted for in the following evaluations and findings.

1. Evaluation and Finding for Alternative A (No Action)

The No Action Alternative of the Willow MDP EIS precludes the currently proposed development in the BTU, and no oil from the BTU field would be produced. Under this alternative, no new roads, airstrips, pipelines, or other oil and gas facilities would be constructed pursuant to CPAI's application for development in the BTU.

Activities that are currently allowed pursuant to the 2013 NPR-A IAP/EIS ROD would continue. These activities include seismic exploration, exploratory drilling of test wells, and the construction of ice roads and pads to support these operations.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

No additional impacts to subsistence uses and needs would be expected under the No Action Alternative. Impacts in the Project area would be expected from those actions associated with scientific research during the summer and oil and gas exploration during the winter. Numerous studies are conducted on a year-round basis on the North Slope. Aerial surveys are conducted by fixed-wing aircraft or helicopter, and ground surveys are conducted on foot, snow machine, or by all-terrain vehicle (ATV); these activities have the potential to disturb wildlife. However, the effects of these activities on species used by subsistence users are expected to be local and short-term and would have no regional population effects.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation for Willow MDP EIS Alternative A (No Action) regarding the availability of other lands is not applicable because Alternative A does not propose the disposition or use of public lands.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternative A (No Action) would not eliminate the use of public lands needed for subsistence purposes. However, Alternative A does not meet the purpose of the proposed action to produce oil discovered on CPAI's BTU leases. The Willow MDP Draft EIS Appendix D, *Alternatives Development*, Section 3.1.3 (*Alternative Components Considered but Eliminated from Further Analysis*) discusses other alternatives that were considered but eliminated from detailed analysis due to economic or technological feasibility or practicability, or because they did not meet the purpose of the proposed action. Alternative A is included in the analysis for baseline comparison, but the BLM does not have the authority to select this alternative because CPAI's leases are valid and the right to drill is associated with leases.

d. Findings

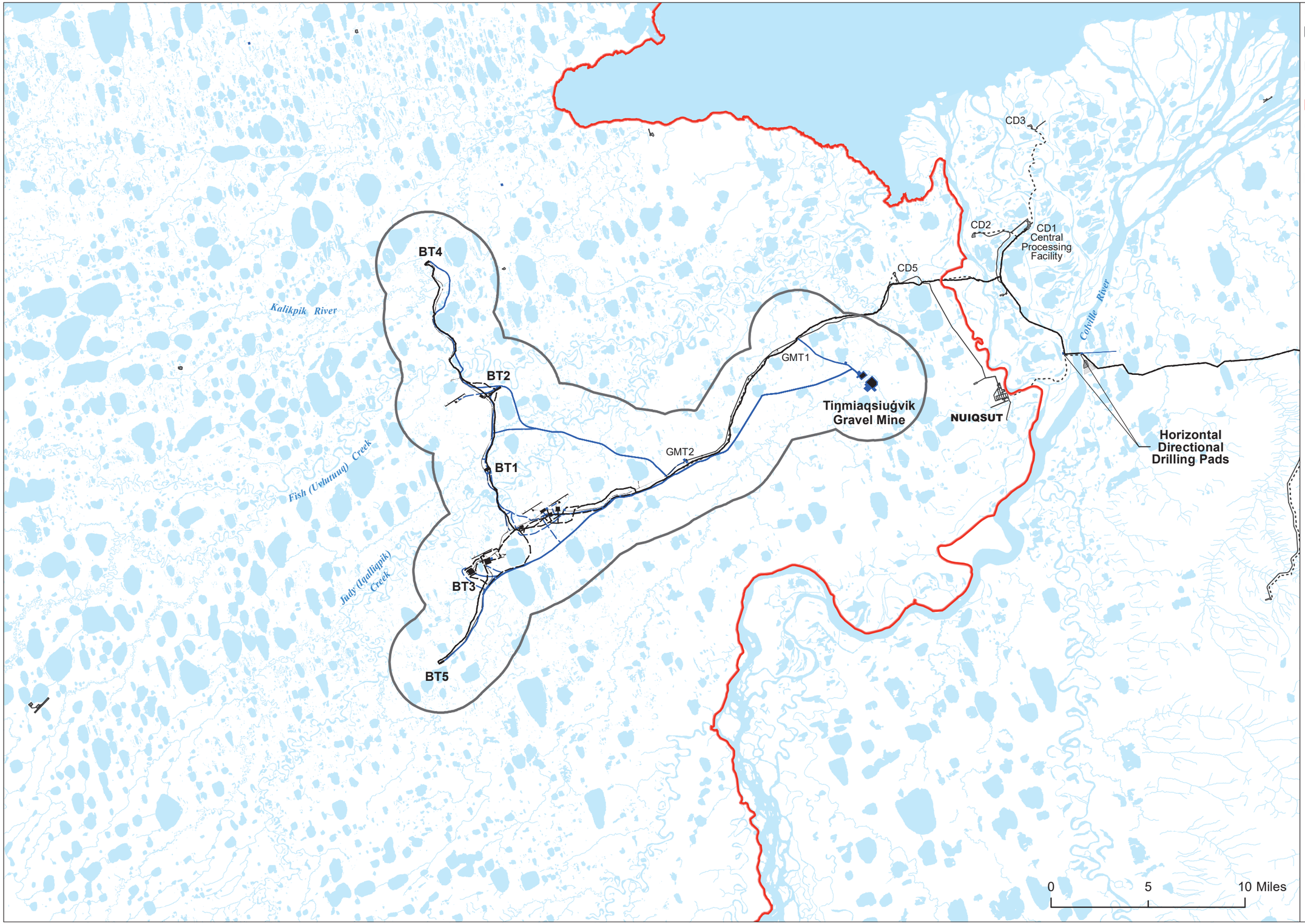
The effects of the No Action Alternative fall below the level of possibly significantly restricting subsistence uses and needs. The impacts to subsistence resources and access discussed above would be minimal. This finding applies to the entire Project study area.

2. Evaluation and Finding for Alternative B (Proponent's Project)

Development of oil reserves in the BTU would occur under Alternative B, the Proponent's Project. Infrastructure would include five drill sites (BT1, BT2 , BT3, BT4, and BT5), WPF colocated with BT3, WOC near BT3, an all-season gravel road connection extending from the GMT-2 drill site southwest to the WPF, an airstrip, infield and export pipelines, gravel roads (including eight turnouts with subsistence/tundra access ramps and seven associated bridges) connecting the five drill sites to the WPF, and a water source access road near BT5. Gravel roads would cross both the Judy (Iqalliqpik and Kayyaaq) and Fish (Uvlutuuq) creeks. During construction, the Project would also develop the Tiŋmiaqsiuġvik gravel mine site (with up to two distinct mine pits), a module delivery option (see Sections B.5, *Evaluation and Findings for Module Delivery Option 1: Atigaru Point Module Transfer Island;* B.6, *Evaluation and Findings for Module Delivery Option 2: Point Lonely Module Transfer Island; and Option 3: Colville River Crossing*), and associated ice roads for gravel haul and/or module transport.

In the Willow MDP Draft EIS, the BLM analyzed potential direct impacts on subsistence based on a 2.5-mile buffer of permanent and temporary (e.g., ice roads) infrastructure associated with Alternatives B, C, and D, in addition to the gravel mine site and ice roads (Figure 1). Because the 2.5-mile buffer of the three action alternatives is nearly identical, it was not necessary to provide a separate analysis area for each action alternative. Thus, while the footprint of development infrastructure and activity is similar under all action alternatives, differences in infrastructure design, infrastructure placement, and operational details determine how and to what level subsistence uses would be affected. These differences are discussed qualitatively. The alternatives analysis area includes both permanent infrastructure and temporary infrastructure (e.g., ice roads, ice pads) that would only be present during the construction phase. The difference in impacts between the construction and operations phases are discussed qualitatively. In addition, the alternatives analysis area does not include upgrades to infrastructure or new infrastructure that would occur within the footprint of existing development areas (e.g., new pipelines that would colocate with existing pipelines and roads east of GMT-2), nor does it include all areas where development-related activity, such as air traffic, would occur. These indirect effects are discussed where applicable. While each action alternative would also include a module delivery option and associated ice roads, because there is more than one module delivery option, the three options and associated ice infrastructure are analyzed separately using a separate 2.5-mile buffer (Sections B.5, B.6, and B.7). Minor changes to the action alternative footprints and resulting changes to the analysis are addressed in the SDEIS Section 3.16.2.1, *Alternatives B, C, and D*.

The alternatives analysis area allows for more detailed analysis of the area where subsistence users are most likely to experience direct impacts from the Project. Additional direct and indirect impacts that would occur outside the alternatives analysis area are also addressed. In addition to the alternatives analysis area, a direct effects analysis area, which is defined as a 2.5-mile buffer around all action alternatives and module delivery options, is used in the Willow MDP SDEIS Subsistence Appendix (Appendix B) to characterize the nature of subsistence uses, including timing and transportation methods, within the area of potential direct effects.



Willow Proposed Development Features
- Alternative Analysis
- Ice Road
- Gravel Footprint

Land Designation
- National Petroleum Reserve in Alaska

Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

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Figure 1

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The Willow MDP alternatives analysis area (Figure 1) lies within areas heavily used by Nuiqsut residents for subsistence, particularly for harvesting of caribou and furbearers (wolf and wolverine) with some goose hunting and limited moose and eider hunting also occurring within the alternatives analysis area. The alternatives analysis area lies within the eastern periphery of Utqiaġvik subsistence use areas for wolf, wolverine, and caribou. During interviews with Nuiqsut active harvesters for the 1995 through 2006 time period, 88% of harvesters reported using the alternatives analysis area, with wolf, wolverine, and caribou being the primary targeted resources (Table 3.16.5 in the Willow MDP Draft EIS Section 3.16.2.3, *Alternative B: Proponent's Project*). Based on annual data for the Nuiqsut Caribou Subsistence Monitoring Project for the 2008 through 2016 time period, use of the alternatives analysis area for caribou hunting on an annual basis appears somewhat lower (between 29% and 61% during individual study years, Table 3.16.6 in the Willow MDP Draft EIS Section 3.16.2.3). The percent of total caribou harvests occurring within the alternatives analysis area throughout 9 years of the Nuiqsut Caribou Subsistence Monitoring Project has ranged from 6% to 18%. In the area directly east of the analysis area and directly west of the community of Nuiqsut, harvests have ranged from 14% to 43%, with recent years showing an increase in harvests coming from this area (SRB&A 2018a). Eleven percent of Utqiaġvik harvesters reported using the alternatives analysis area, primarily for wolf and wolverine, during the 1997 through 2006 time period.

For Nuiqsut, caribou is a resource of major importance, both culturally and as a food source, and the alternatives analysis area includes lands that are highly used for caribou hunting or lands that are directly west of areas highly used for caribou hunting (Figures 2 and 3). While furbearers generally are not a food source for the community, furbearer hunting and trapping has cultural value as it is a specialized activity, often among highly active harvesters, which contributes to the local economy and provides materials for Native crafts and clothing. The alternatives analysis area is heavily used by furbearer hunters in Nuiqsut (Figure 4).

Thus, impacts to both caribou and furbearer resources are considered in this ANILCA Section 810 evaluation, in addition to indirect and cumulative impacts to other harvesting activities, such as fishing and waterfowl hunting, where applicable. Nuiqsut lies on the eastern periphery of the Teshekpuk Caribou Herd (TCH) range and the western periphery of the Central Arctic Caribou Herd (CAH) range. Estimates based on the timing and location of harvests indicate that a majority of Nuiqsut's caribou harvest is from the TCH, which is the primary herd that occurs within the alternatives analysis area (Braem, Kaleak et al. 2011). The CAH also contributes to the community's overall harvest, and caribou from this herd may cross to the west of the CRD on occasion. However, the CAH generally occurs east of the alternatives analysis area and impacts to harvests to this herd resulting from Alternative B would likely be minimal.

The alternatives analysis area is on the periphery of Utqiaġvik subsistence use areas but is directly east of the Teshekpuk Lake area, which is a key traditional use area for many Utqiaġvik residents (Figure 5). The alternatives analysis area is used during some years for hunting of wolf and wolverine and may be particularly important during years when these resources are less available elsewhere. Caribou may also be harvested during these furbearer hunting trips, but the alternatives analysis area is generally not used specifically for Utqiaġvik caribou hunting (SRB&A 2010b). Thus, the ANILCA Section 810 evaluation focuses on potential impacts to furbearer harvesting for Utqiaġvik, in addition to indirect or cumulative impacts to other resource harvesting activities. Like Nuiqsut, furbearer hunting is practiced by a relatively small proportion of households, but it is a culturally important and specialized activity in Utqiaġvik.

Subsistence Resource Abundance

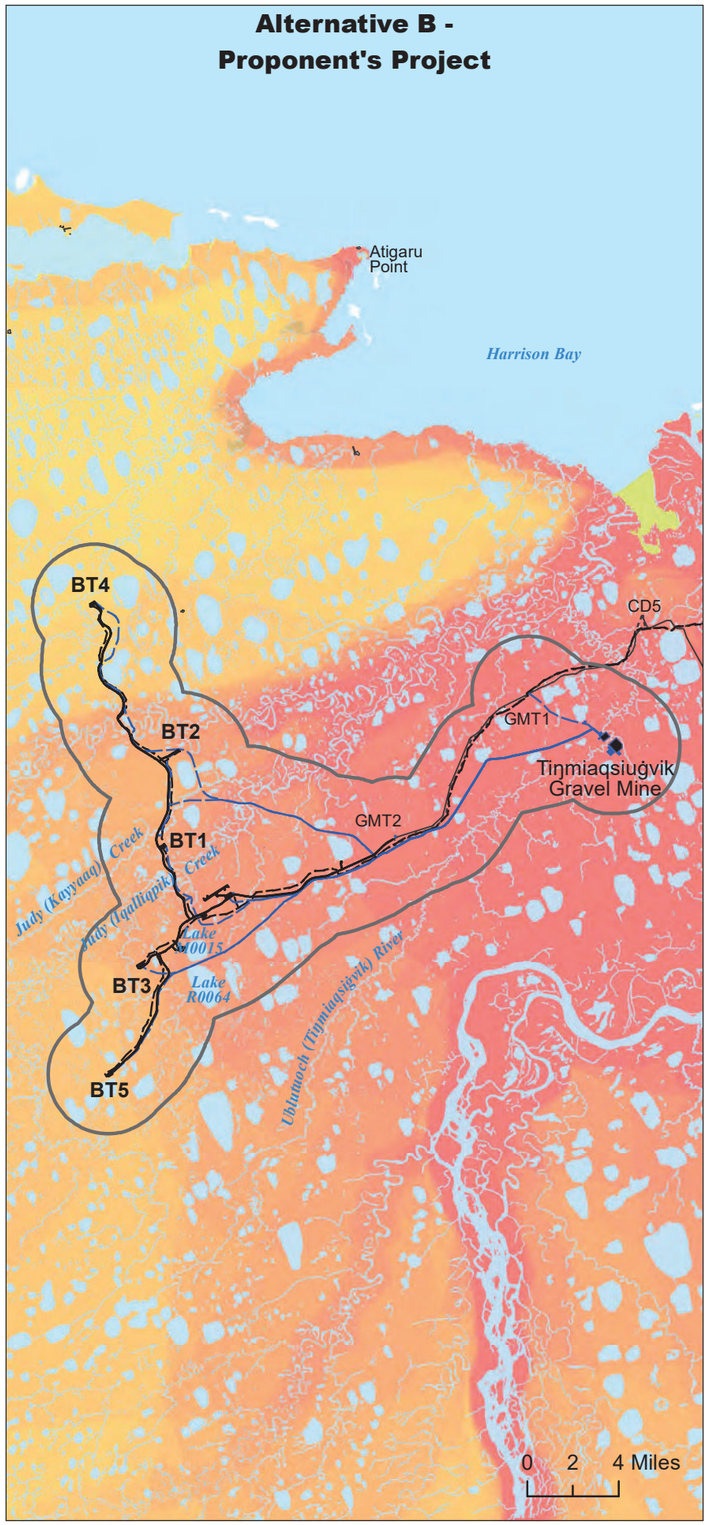
As noted above, the TCH is the primary herd that occurs in the alternatives analysis area, with seasonal migrations occurring through the area during the spring and fall, and large numbers of caribou sometimes occurring in the area during the oestrid fly season (July through August), a peak hunting time for Nuiqsut (Willow MDP Draft EIS Section 3.12.1, *Affected Environment*). The alternatives analysis area occurs in areas of relatively low caribou calving density. Impacts to caribou populations could occur through direct

mortality (e.g., vehicle strikes) or through decreased calf survival resulting from impacts to calving grounds or to the behavior of maternal caribou. Injuries and mortality resulting from vehicle collisions may occur but are not expected to have population-level effects (Willow MDP Draft EIS Section 3.12.2.3.3, *Injury or Mortality*). In addition, while the Project may result in displacement of some calving caribou because the alternatives analysis area is located in low density calving areas for the TCH, displacement would likely not have population-level effects (Willow MDP Draft EIS Section 3.12.2.3.2, *Disturbance or Displacement*). Thus, the abundance of caribou available for subsistence use would not be impacted under Alternative B.

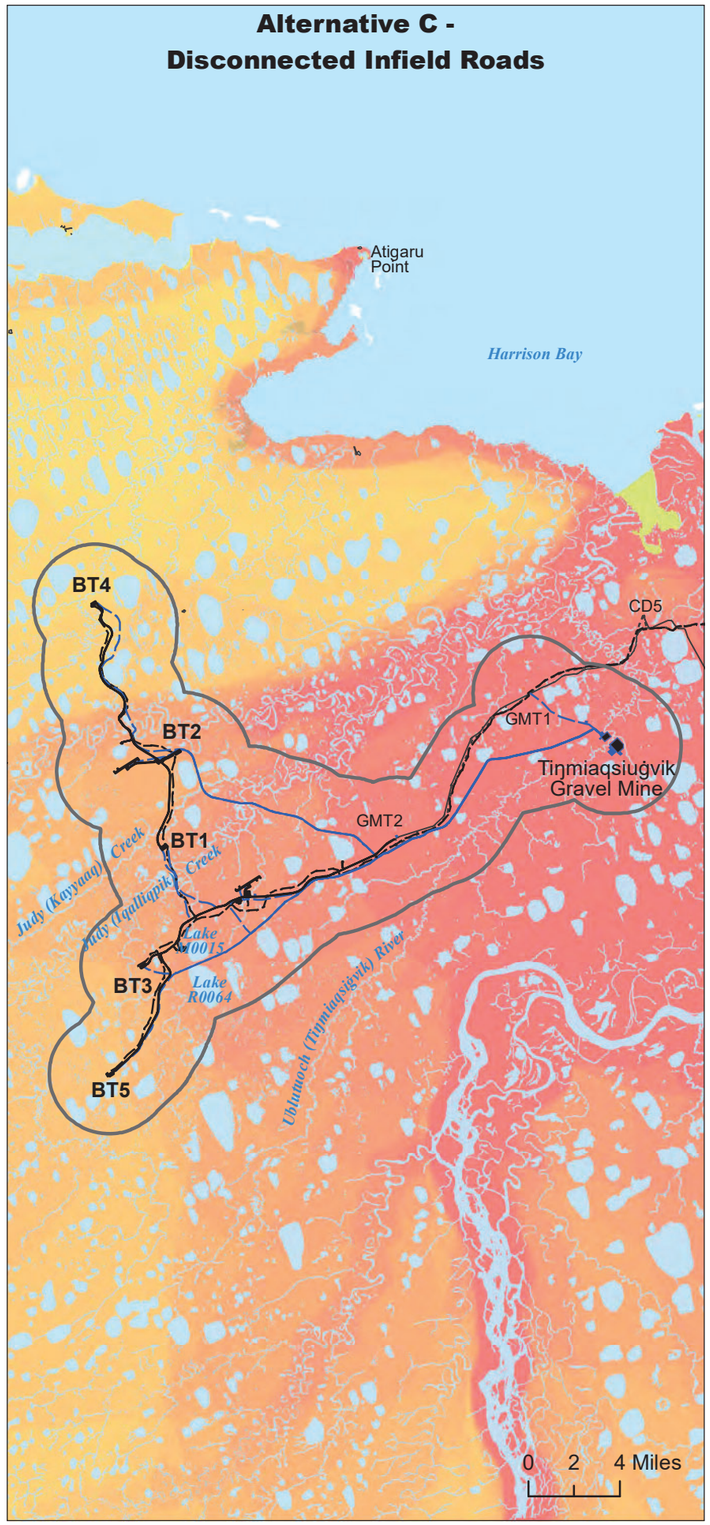
The alternatives analysis area does not have a high density of wolves or wolverines, although the area is heavily used by Nuiqsut furbearer hunters who generally cover large areas in pursuit of these resources. While wolf and wolverine would likely be displaced by infrastructure and human activity and some individual mortalities of wolverine may occur, overall population levels are not expected to be affected by the Project (Willow MDP Draft EIS Appendix E.12, *Terrestrial Mammals Technical Appendix*). Thus, the abundance of wolf and wolverine available for subsistence use would not be impacted under Alternative B.

While generally not harvested within the alternatives analysis area, other subsistence resources that could experience direct or indirect impacts from the Project include waterfowl and fish. Waterfowl hunting occurs to the north and east of the alternatives analysis area, while fishing of broad whitefish and other fish species occurs downriver from the alternatives analysis area in Fish (Uvlutuuq) Creek. Habitat loss and degradation could displace or cause individual mortalities of these resources, but the Project is not expected to cause population-level effects. A large oil spill could have population-level effects but is not expected to occur (Willow MDP Draft EIS Sections 3.10, *Fish*, and 3.11, *Birds*).

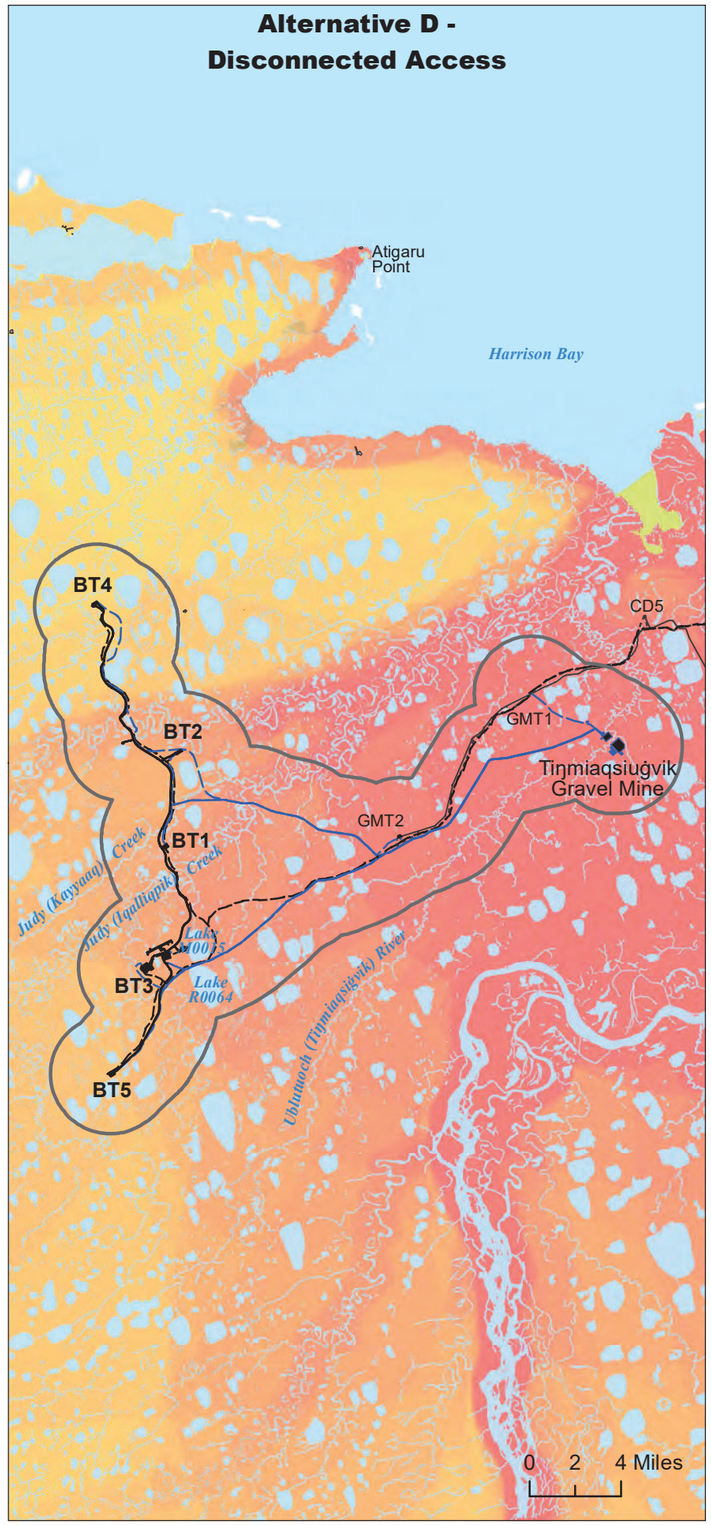
Alternative B - Proponent's Project



Alternative C - Disconnected Infield Roads



Alternative D - Disconnected Access



Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Caribou, 1995-2006[a]
- Alternative Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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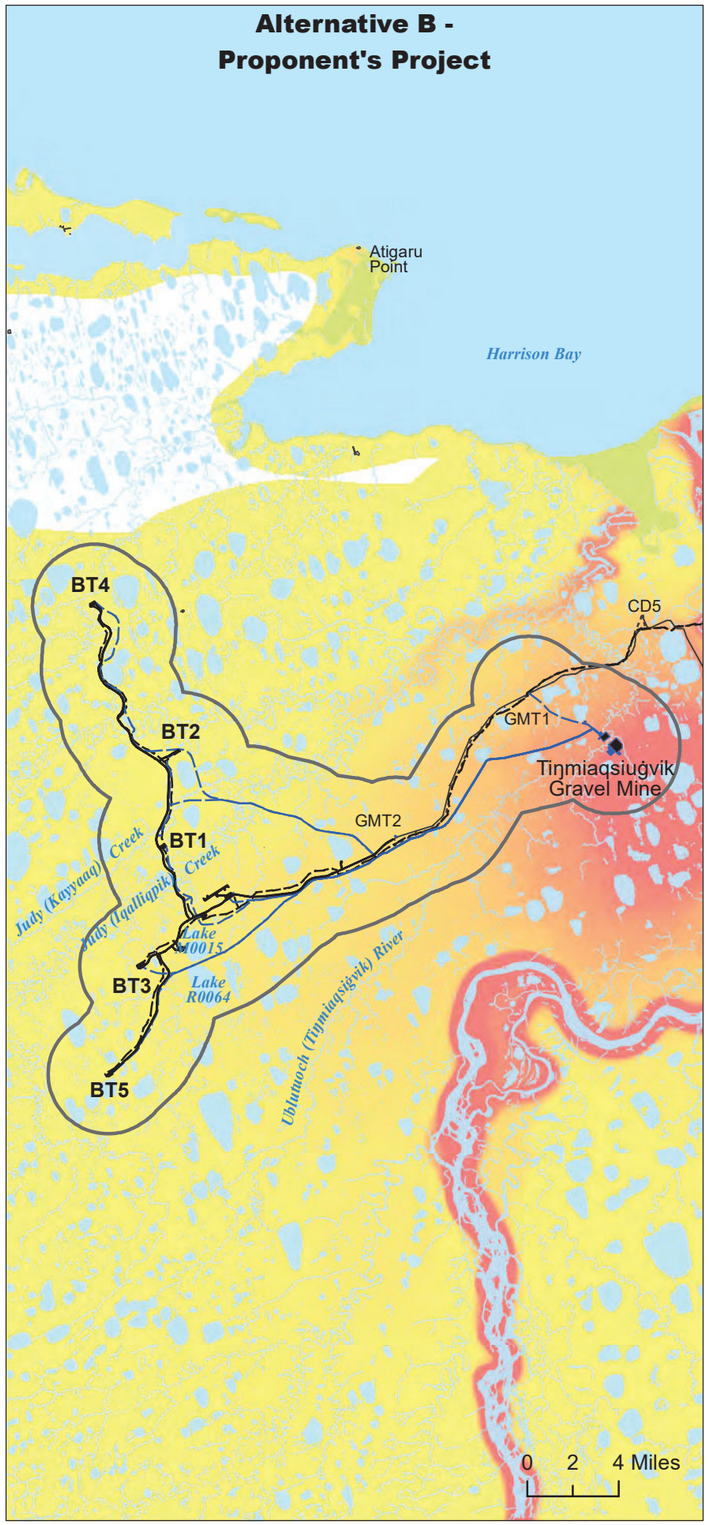
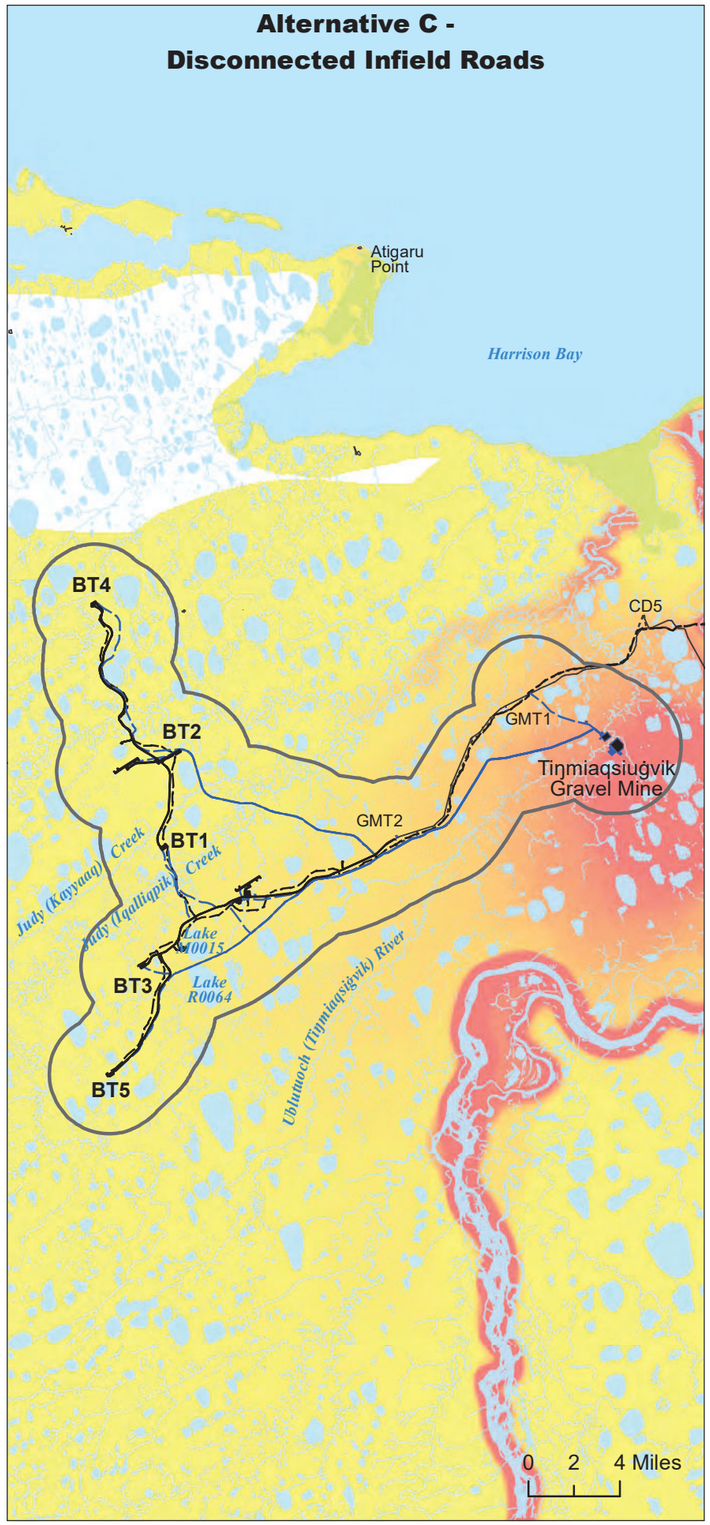
Figure 2

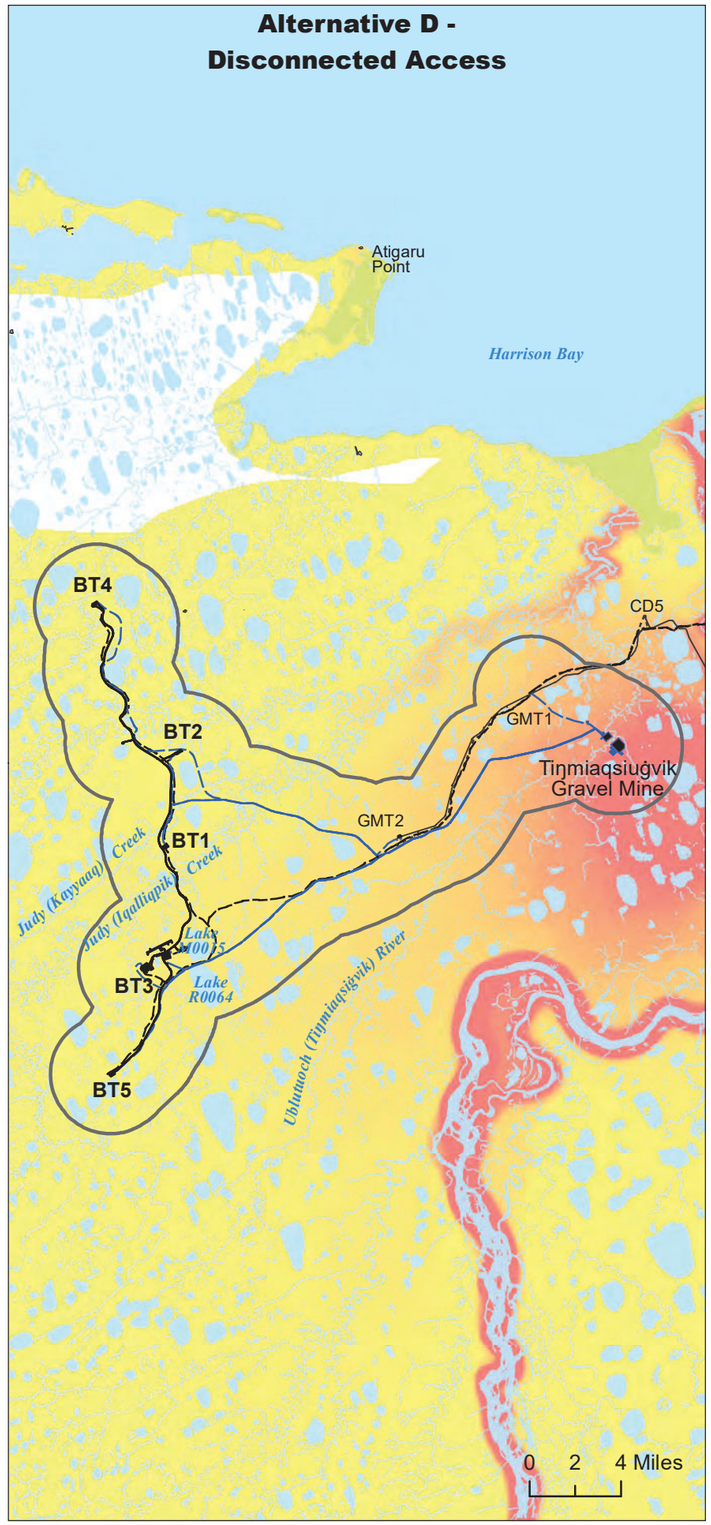
Alternative B - Proponent's Project



Alternative C - Disconnected Infield Roads



Alternative D - Disconnected Access



Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Caribou, January 2008 through October 2016[a] (High / Low)
- Alternative Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2018

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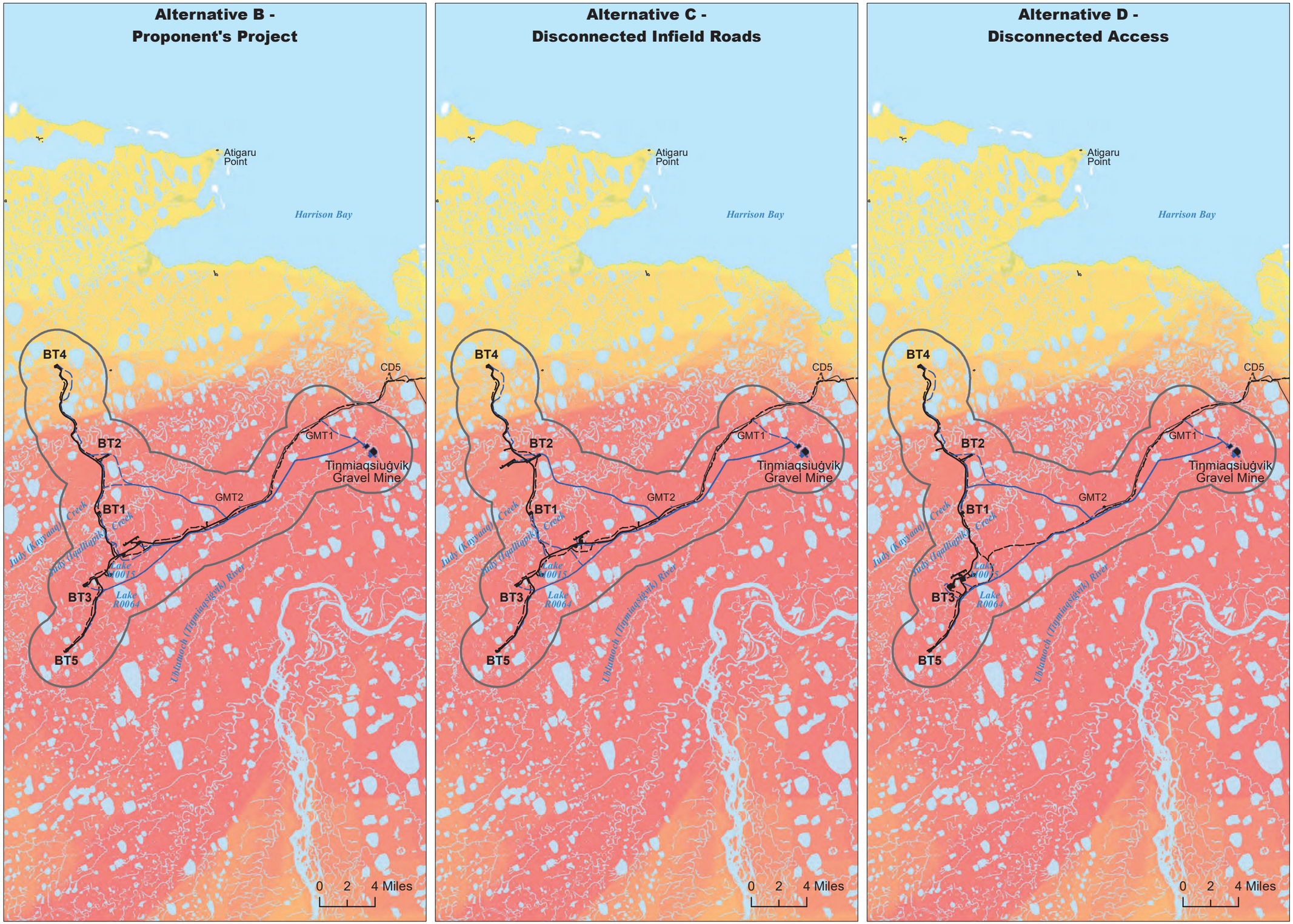
Figure 3

Alternative B - Proponent's Project

Alternative C - Disconnected Infield Roads

Alternative D - Disconnected Access



Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006 [a]
- Alternative Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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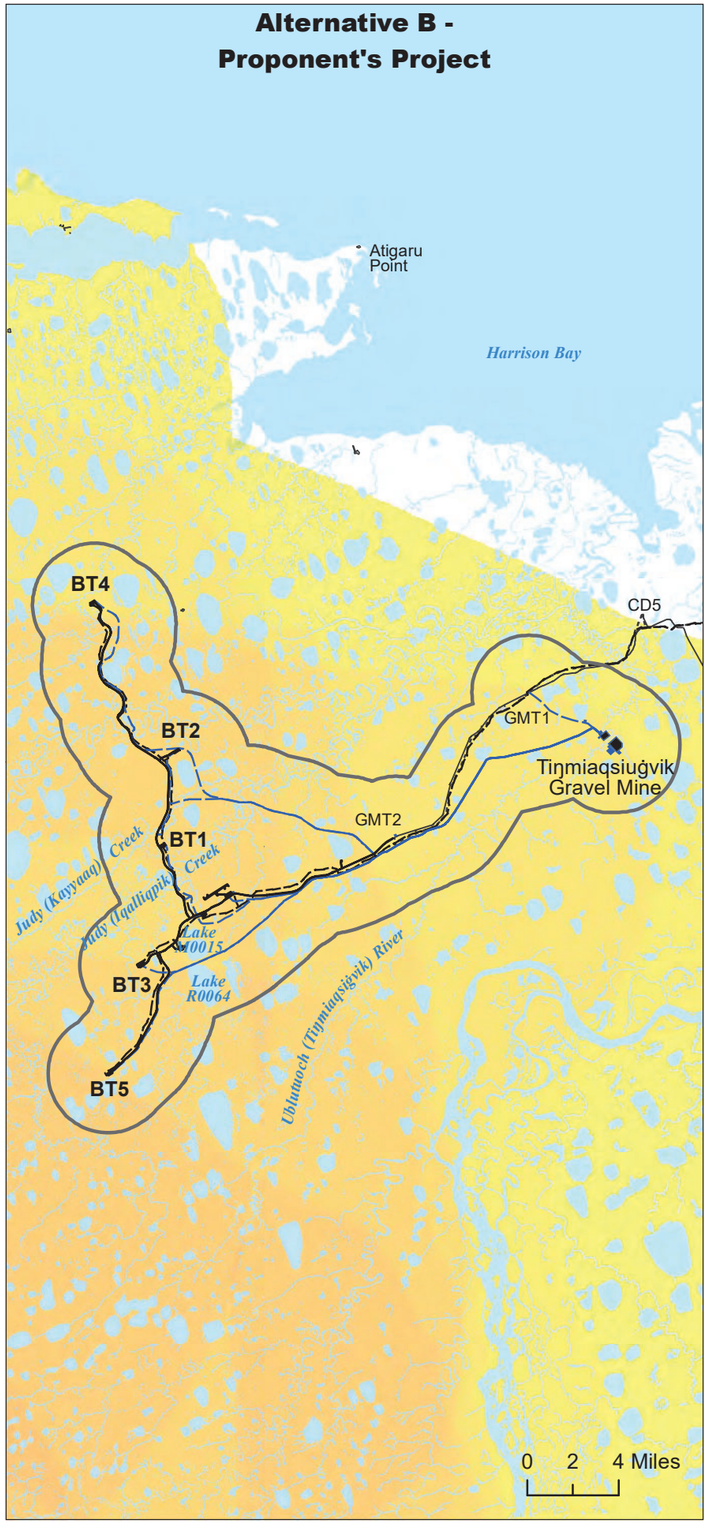
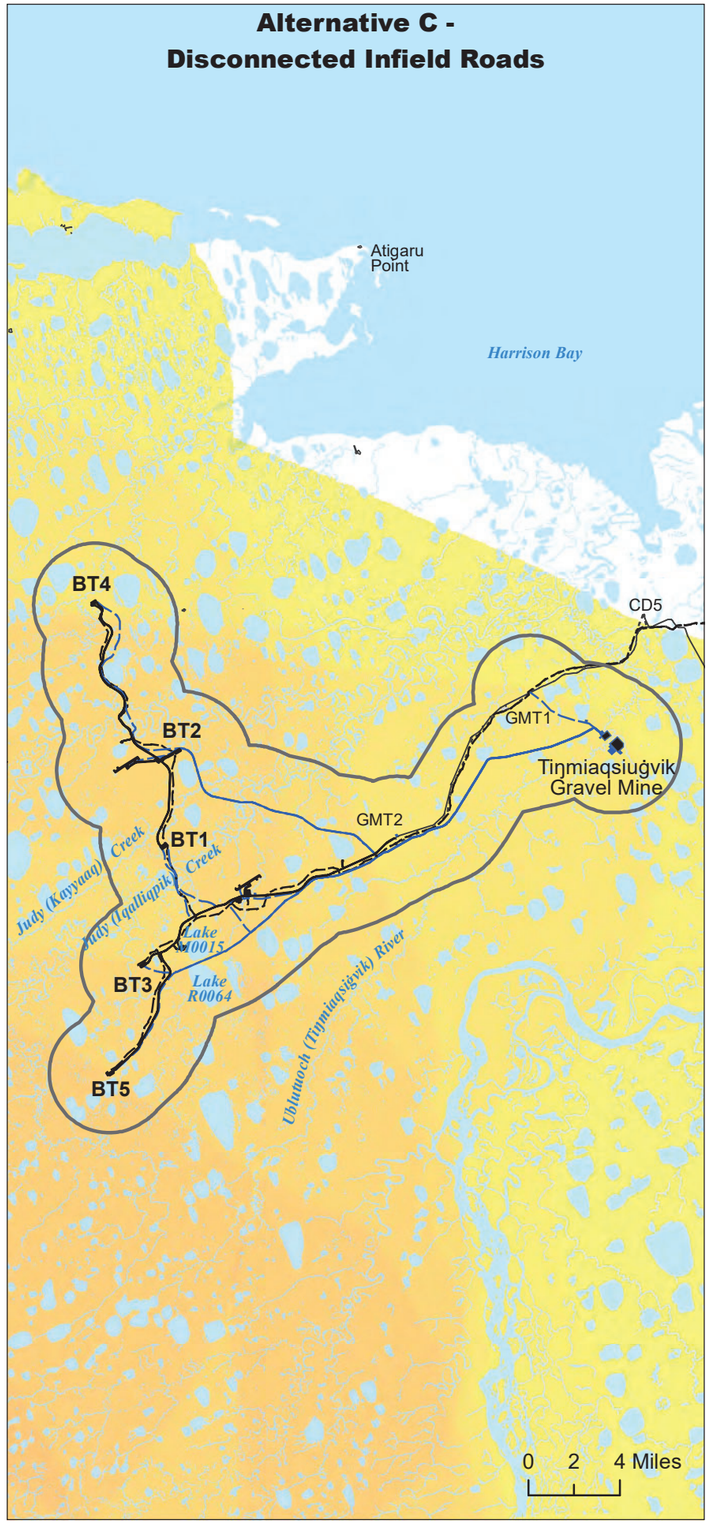
Figure 4

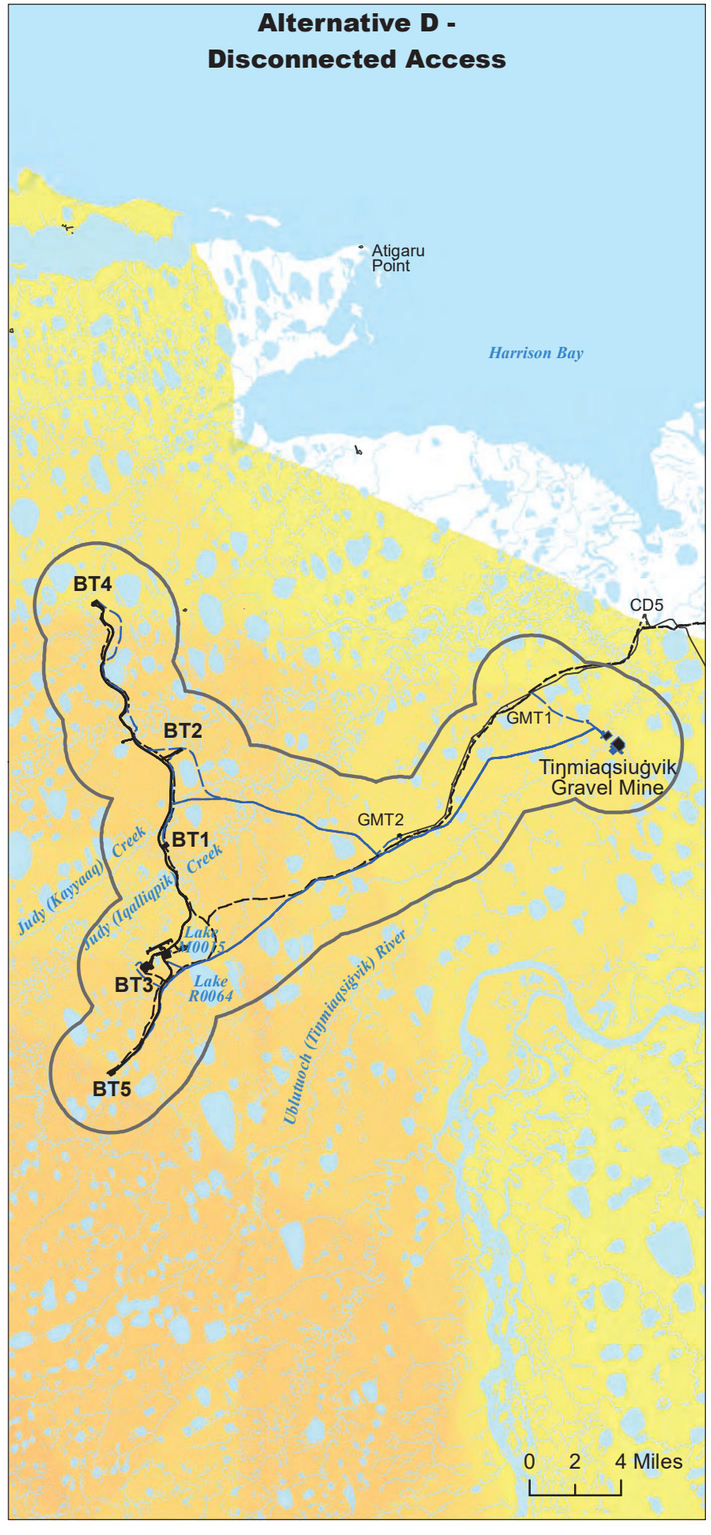
Alternative B - Proponent's Project



Alternative C - Disconnected Infield Roads



Alternative D - Disconnected Access



Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Wolf and Wolverine 1997-2006 [a] (High / Low)
- Alternative Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 5

Subsistence Resource Availability

A description of subsistence uses for Nuiqsut and Utqiaġvik is provided in Willow MDP Draft EIS Section 3.16.1, *Affected Environment*, and in Willow MDP Draft EIS Appendix E.16, *Subsistence Technical Appendix*. Nuiqsut caribou hunting primarily occurs along the Colville River drainage, including the Niġliq and East channels, as well as in overland areas to the west, southwest, and northwest of the community. While boat is the primary method of travel to caribou hunting areas along the Colville River, overland areas west of the community are primarily accessed by ATV, snow machine, and, since construction of the Spur, CD5, and Greater Mooses Tooth 1 (GMT-1) roads, by automobile. Use of the area west of Nuiqsut for caribou hunting has increased somewhat in recent years, partially due to increased access from recently constructed gravel roads. The increase in subsistence use to the west of the community correlates with decreased use of other areas including Niġliq Channel, East Channel, and the Fish (Uvlutuuq) Creek drainage, which has been commonly reported as places of avoidance by local hunters due to development, environmental, and personal factors (SRB&A 2019). Nuiqsut caribou hunting activities in the direct effects analysis area peak from July through September, as does hunting directly east and south of the alternatives analysis area (Willow MDP Draft EIS Appendix E.16). The majority of the use of the alternatives analysis area for caribou hunting occurs in the eastern portion of the area surrounding the proposed gravel mine and access road. Data for the 1995 through 2006 time period shows greater use of the alternatives analysis area; recent years have seen a decrease in use of snow machines and increased use of ATVs, which may partly explain the relatively smaller use areas shown on Figure 3 compared to Figure 2 (SRB&A 2018a). During years with adequate snow cover, use of the area may be higher. Nuiqsut caribou hunters often target caribou in the area west of the community while caribou are most available in the area during the oestrid fly season (July and August) and fall migration (August and September). During these time periods, caribou may cross through the Project and alternatives analysis area before being hunted to the west of the community.

Nuiqsut wolf and wolverine hunting is a winter subsistence activity that occurs in large overland areas to the west, south, and southeast of the community. For the 1995 through 2006 time period, 88% of wolverine harvesters and 87% of wolf harvesters reported using the alternatives analysis area. The majority of the alternatives analysis area is used heavily for wolf and wolverine hunting by Nuiqsut harvesters. Wolf and wolverine hunting in the area peaks from November through March and occurs by snow machine (Willow MDP Draft EIS Appendix E.16, *Subsistence Technical Appendix*).

Potential impacts to the abundance of subsistence resources are discussed above. The primary sources of potential impacts to resource availability of caribou, wolf, and wolverine to subsistence users include:

1. Displacement resulting from habitat loss (roads, pipelines, and/or other oil and gas facilities).
2. Displacement resulting from road disturbance.
3. Displacement from air traffic.
4. Displacement from other infrastructure and sources of disturbance.

These impacts are discussed in further detail below.

Displacement of Caribou Due to Habitat Loss

Impacts on caribou related to habitat loss are discussed in Willow MDP Draft EIS Section 3.12, *Terrestrial Mammals*. The Project area is to the east and south of the TCH primary calving grounds which, in recent years, occur with the greatest density to the southeast of Teshekpuk Lake. Alternative B would remove 656.6 acres of terrestrial mammal habitat due to gravel mining and construction of gravel infrastructure. Additional habitat loss or alteration would result from gravel spray and dust deposition. The habitats that would be affected by Alternative B are not unique, and similar habitats would be available nearby. Thus, habitat loss and alteration associated with the Project would likely cause caribou to move to similar habitats nearby and would not have overall impacts on subsistence resource availability for Nuiqsut harvesters.

Displacement of Caribou Due to Road Disturbance

Impacts on caribou and caribou hunting resulting from road-related disturbance are discussed in Willow MDP Draft EIS Sections 3.16.2.3.2.1, *Resource Availability–Caribou*, and 3.12.2.3.2, *Disturbance or Displacement*. The increasing presence of roads near Nuiqsut has resulted in increased reports of impacts to hunting from roads and road traffic (SRB&A 2016, 2017a, 2018a). As noted above, the Project area would be in the northeastern portion of the range of the TCH. In the spring (May and June), some TCH caribou migrate through the Project area on their way to calving grounds, with males arriving in mid- to late-June when Nuiqsut residents begin traveling by boat to hunt caribou. In the summer oestrid fly season (July and August), caribou sometimes occur in the area of proposed infrastructure in large numbers, and in the fall, large numbers of caribou may move through the Project area as they migrate south to their wintering grounds (Prichard, Macander et al. 2018).

The Alternative B Project access road would bisect a portion of the fall migration corridor and would occur in areas heavily used by TCH caribou in some years (during both the summer and winter months). Residents hunt to the west, northwest, and southwest of the community of Nuiqsut during the summer and fall by ATV, and they hunt to the northwest of the community by automobile. In addition, residents hunt caribou by boat along the Colville River to the southeast of the proposed road corridor in the months of July, August, and September (Willow MDP Draft EIS Appendix E.16). While the majority of this hunting occurs in the eastern portion of the alternatives analysis area near the proposed mine site and directly east of the proposed road, some residents also travel as far as the proposed gravel road, particularly when using the existing road system to access hunting areas. The most heavily used hunting areas are directly east and northeast of the proposed access road. Some caribou may remain in the Project area throughout the winter and are hunted by individuals on snow machine or, in recent years, along the road. While the number of caribou that occur within the alternatives analysis area may represent a small portion of the overall herd, they represent an important source of caribou available to the community of Nuiqsut. Thus, roads associated with the Project have a high potential for disturbance of caribou and Nuiqsut caribou hunting activities. While some Utqiaġvik hunters may venture into the western portion of the alternatives analysis area in some years during winter, the area is not a primary hunting area for caribou for that community. Thus, this discussion focuses on potential impacts to Nuiqsut hunters resulting from road disturbance.

Roads and road traffic are believed to cause behavioral and migratory changes in caribou that can affect hunting success. Deflections or delays of caribou movement from roads and associated ground traffic and human activity have been documented both by active harvesters (SRB&A 2010a, 2011, 2012, 2013, 2014b, 2015, 2016, 2017a, 2018a) and during behavioral studies on caribou (Wilson, Parrett et al. 2016). During the Nuiqsut Caribou Subsistence Monitoring Program, reports of road-related impacts on caribou hunting have steadily increased since road construction began. Year 9 of the study was the first year where impacts related to man-made structures (e.g., roads, pipelines) were as common as impacts related to helicopter traffic (SRB&A 2018a). In Year 10, when constructed roads included the Spur, CD5, and GMT-1 roads, impacts from human-made structures were the most commonly reported impacts (SRB&A 2019). Residents indicate that the roads pose both a physical and visual barrier to the caribou and have observed changes in caribou distribution and behavior around roads, including decreased availability of caribou closer to the community (SRB&A 2019). Residents also note that safety considerations around roads reduce the availability of individual caribou as residents are careful not to shoot toward infrastructure.

Impacts related to roads have also been observed by Noatak and Kivalina caribou hunters in regards to the Red Dog Delong Mountain Transportation System (DMTS) (SRB&A 2014a). Residents have reported that some caribou will stop once they reach the DMTS, sometimes traveling alongside the road before crossing, and other times bypassing the road altogether. Such behavior has also been documented through radio collar observation. A study conducted by Wilson, Parrett et al. (2016) found that the DMTS influenced the movements of approximately 30% of radio-collared Western Arctic Caribou Herd caribou, and the average delay in crossing was 33 days. Caribou from the TCH, which also cross the DMTS during certain years, were not similarly affected. In general, observed caribou behavior in response to the

DMTS is variable; in some cases, caribou cross seemingly without delay, while in other cases, herds scatter and migration is delayed for multiple days (ABR Inc. and SRB&A 2014; SRB&A 2014a; Wilson, Parrett et al. 2016).

Avoidance of roads is particularly common for maternal caribou (displacement of between 1.2 and 2.5 miles [2 and 4 kilometers] from roads) (Willow MDP Draft EIS Section 3.12, *Terrestrial Mammals*). Displacement of calving caribou would likely not have direct effects on hunter success, as hunting during the spring calving season is low and the hunting that does occur focuses on males. During the mosquito and oestrid fly seasons, caribou are highly mobile due to insect harassment and regularly approach and cross pipelines; however, deflected movements and delays become common where roads and pipelines are close to one another or where traffic rates exceed 15 vehicles per hour (Willow MDP Draft EIS Section 3.12). Deflections or delays of several hours could have substantial impacts to harvesting success for residents hunting to the east of the road corridor, particularly hunters waiting along river corridors with no means of approaching delayed herds. Traffic rates of over 15 vehicles per hour would be more common during construction, and therefore decreased hunting success resulting from delayed caribou crossings would be more frequent during the construction period. It is likely that caribou deflections would continue during operations but at a lower intensity and frequency than during Project construction. In addition to increased road traffic along Project roads, development of the Project would also increase road traffic along existing roads connecting the Project area to Greater Mooses Tooth (GMT) and Alpine developments. Thus, impacts related to roads would extend beyond the alternatives analysis area.

Effects on caribou movement are most likely to occur where linear structures are placed parallel to the herd's primary movement (Wilson, Parrett et al. 2016), though perpendicular roads may also intercept caribou and cause delayed crossing (BLM 2018; CPAI 2018). The Alternative B access road, where it intersects with infield roads, could create a "pinch point" and deflect caribou away from the road during the fall migration. An overall deflection of migration could have substantial impacts to residents hunting caribou in overland areas during the fall. Temporary changes in distribution have not been shown to alter overall migration patterns or herd distribution (Willow MDP Draft EIS Section 3.12); however, small changes in caribou distribution and movement from a biological perspective can have large impacts on hunter success as residents are generally limited in how far and fast they can travel, particularly during the snow-free season. Because Nuiqsut is on the periphery of the two caribou herds which they rely upon (Prichard, Macander et al. 2018), they are particularly vulnerable to small changes in overall herd distribution or migration.

Caribou responses to roads seem to vary from year to year based on the context in which roads are encountered; thus, while Project roads may not deflect caribou during all seasons or years, in some years, substantial deflections or delays could take place. Based on available data, it is not possible to predict the exact frequency or intensity at which deflections would take place. However, it is reasonable to conclude that resource availability would be affected as a result of the road and subsistence hunters may experience decreased overall hunting success during certain years as a result.

According to CPAI (2018), the TCH may be less habituated to development activity than the CAH due to the relative lack of infrastructure within its range. Thus, TCH caribou may be more prone to disturbance than the CAH (Willow MDP Draft EIS Section 3.12). Impacts on resource availability would most likely occur during the summer and fall months when caribou hunting activity in overland areas and along the Colville River is highest (Table E.16.7 in the Draft EIS Appendix E.16). During the oestrid fly season, groups of caribou could gather on gravel pads and gravel roads for insect relief; which may result in increased availability of caribou for individuals hunting along roads but may also increase the likelihood of vehicle strikes and mortalities. Individuals not using roads to access caribou may experience reduced success closer to Nuiqsut, as the caribou are delayed or deflected from crossing roads toward the community's primary hunting area west of the community or along the Colville River toward Ocean Point. Increased hunting along the road corridor could also reduce the availability of caribou for hunters along river corridors or to the east of the road corridor.

Overall caribou harvests for the community of Nuiqsut as a whole have remained stable over time (during study years spanning the 1980s through 2017) (SRB&A 2019). Residents have reported that access to roads has offset some of the impacts of increased infrastructure and activity on resource availability by providing hunting access to areas farther from the community, although some report avoiding the roads altogether. While road use, in terms of the percentage of active harvesters, has increased somewhat since road construction began, the percentage of harvests occurring within the developed area has remained relatively stable, suggesting that the presence of roads has not had a net benefit on resource availability (SRB&A 2019). However, this conclusion is based on only 4 years of post-road construction data, and hunting patterns will likely continue to change and adapt to the increasing presence of roads. Consequently, it is difficult to draw conclusions at this time regarding the magnitude of impacts of the CD5, GMT-1, and recently built GMT-2 roads based on existing data. Impacts of roads on resource availability will vary from year to year and will depend on multiple factors including traffic rates, environmental factors affecting caribou movement, and hunter adaptation to changes.

Displacement of Caribou Due to Air Traffic Disturbance

During construction, fixed-wing airplanes would be the primary source of air traffic, with helicopters used to support ice road construction, surveying, and monitoring (CPAI 2018). Once the airstrip is constructed, air traffic to the Project area would likely increase to multiple daily flights throughout the life of the Project, although at slightly lower levels during the drilling and operations phases. Helicopter traffic would occur on a periodic basis throughout the life of the Project.

Caribou responses to air traffic disturbance and related impacts on caribou hunters are discussed in Willow MDP Draft EIS Sections 3.12, *Terrestrial Mammals*, and 3.16, *Subsistence and Sociocultural Systems*. Until recently, air traffic, particularly helicopter traffic, has been the most commonly reported impact on caribou hunting to the Nuiqsut Caribou Subsistence Monitoring Project (CPAI 2018; SRB&A 2018a, 2019). Air traffic could cause direct and indirect disturbances to caribou availability both within and outside of the alternatives analysis area. Nuiqsut hunters have observed that caribou behavior often changes in response to air traffic, particularly helicopter traffic and fixed-wing traffic at low altitudes. Observed behavioral responses include caribou "scattering" rather than remaining in groups where they are easier to hunt, acting skittish, and deflecting away from the source of noise or away from riversides (where hunters wait for them) (SRB&A 2010a, 2011, 2012, 2013, 2014b, 2015, 2016, 2017a, 2018a). Hunters have frequently recounted experiences where a potentially successful harvest was disrupted by air traffic overhead, with caribou diverting to locations too far from riversides for hunters to access.

Increased air traffic associated with the Project would likely affect hunting activities in overland areas and along rivers, including the Niġliq Channel and the Colville River upriver toward Ocean Point. The increase in overall air traffic in the region associated with the Project would increase the frequency of disturbances experienced by Nuiqsut hunters. According to SRB&A (SRB&A 2018a), the area west of Nuiqsut accounts for a substantial percentage of Nuiqsut's annual caribou harvest, and increased air traffic within that area could affect Nuiqsut harvesting success during the construction and operation phases. Impacts of air traffic to caribou resource availability would be most likely during the summer oestrid-fly season and in the fall when caribou migrate in an easterly direction, often crossing through the Project area into areas heavily used by Nuiqsut caribou hunters (Willow MDP Draft EIS Figures 3.16.7 and 3.16.8; Figure B.2 in Willow MDP SDEIS Appendix B). However, air traffic impacts could occur year-round.

Displacement of Caribou Due to Other Infrastructure and Sources of Disturbance

Other potential sources of impacts to caribou availability include construction noise (including noise associated with gravel mining), drilling noise, general human activity, and contamination events. These potential impacts to Nuiqsut subsistence resource availability are discussed in Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*. Noise associated with gravel mining (including blasting), mining equipment and machinery, and excavation, could cause caribou to avoid the mine site area or to act skittish. Blasting and excavation would occur over five construction seasons, primarily during the winter months, when caribou hunting levels are reduced. While winter is not the peak caribou

hunting season for the community of Nuiqsut, harvests occur when caribou are available in the area and when households are in need of meat. Winter harvests are often an important source of food when stocks of summer and fall subsistence foods begin to run low. Winter caribou harvests have been documented occurring to the west and north of the community, including near the proposed mine site. Access to winter ice roads may help offset some of the impacts to resource availability during this time; however, gravel haul and module transport ice roads, which would be the primary ice roads located within the community's hunting area, would be off-limits to subsistence users. In addition to noise associated with mining, the presence of the mine pits could deflect movement of caribou year-round, resulting in localized changes in distribution. The mine pits would be allowed to fill with water following construction and would therefore no longer be suitable habitat for caribou, thus affecting availability of caribou in the immediate area.

Other disturbances associated with construction noise, general equipment operation, human presence and activity, and drilling noise could result in temporary avoidance behavior or deflection of caribou, thus affecting resource availability. Studies show that caribou, especially females with calves, avoid drilling sites, and caribou that do approach drilling sites spend less time feeding and lying down (Fancy 1983; Lawhead, Prichard et al. 2004).

Resources which are perceived as contaminated by subsistence users are often considered unavailable for subsistence use (SRB&A 2009); during a recent Bureau of Ocean Energy Management–funded study, 47% of Nuiqsut households reported avoidance in the previous year of certain subsistence foods due to concerns about contamination (SRB&A 2017b). Use and storage of hazardous materials, solid waste, and drilling waste; generation of air emissions; treatment and disposal of wastewater; and dust deposition, could result in real or perceived degradation of caribou habitat. If individuals perceive or confirm caribou to be contaminated and avoid harvesting caribou that feed near the Project, they may experience reduced caribou resource availability.

Displacement of Furbearers

Potential disturbances of wolf, wolverine, and other furbearers are discussed in Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*, and in Appendix E.12, *Terrestrial Mammals Technical Appendix*. Wolf and wolverine are the primary furbearer resources harvested by Nuiqsut and Utqiaġvik subsistence users in the Alternative B analysis area. Although a higher number of overall caribou harvesters use the area, a higher percentage of wolf and wolverine harvesters—individuals who generally represent a smaller portion of the population and tend to be particularly active harvesters—use the area. During the construction phase, noise and other potential sources of impacts would be highest in winter, when most construction activities (e.g., pile driving, gravel mining, ice road operation) would occur. These activities would displace furbearers near Project activities.

Furbearer harvesters have observed reduced availability of wolf and wolverine near development and human activity, noting their sensitivity to noise and human activity, and their general tendency to avoid developed areas. Throughout the life of the Project, furbearers are likely to avoid areas with equipment and infrastructure or areas with high levels of human activity, noise, and ground traffic. Ground traffic and construction and mining noise would be highest during the winter construction months when furbearer harvesting activities are at their peak. Construction is expected to occur over a period of approximately 7 years with varying levels of intensity. Because wolf and wolverine hunting areas are generally large, accessible by snow machine, and extend in various directions from the community, residents would likely use different areas where the resources are believed to be more available, particularly during the construction phase. However, in some cases, subsistence users may have to expend more effort or go farther because the area to the west of the community is a commonly used and easily accessible area. Operations impacts would be similar to construction but would continue throughout the life of the Project (30 years) at somewhat lower levels. For Nuiqsut, high numbers of overlapping use areas for wolf and wolverine occur around BT1, BT2, BT3, and BT5, while low to moderate overlapping use areas occur around BT4. For Utqiaġvik, low to moderate overlapping use areas occur throughout the

western portion of the alternatives analysis area, with greater intensity to the west and southwest of the analysis area.

Displacement of Other Resources

While caribou, wolf, and wolverine are the primary resources harvested directly within the alternatives analysis area, goose hunting occurs directly to the east and north of the mine site and to the east of the proposed gravel access road along the Colville River, and fishing (primarily for broad whitefish, a key resource for the community of Nuiqsut) occurs downstream from the alternatives analysis area on Fish (Uvlutuuq) Creek. Waterfowl hunting peaks during the months of April and May when residents travel by snow machine to inland and riverine areas where white-fronted goose is known to be abundant (Willow MDP Draft EIS Appendix E.16). While most construction activity would be complete before goose hunting begins, it is possible the ice road season would overlap with the beginning of the waterfowl hunting season in late April. Additionally, blasting at the gravel mine pits may occur into April. Thus, traffic and mining noise may result in temporary displacement or disturbance of waterfowl at the beginning of the hunting season, potentially causing a temporary decrease in harvester success; however, these disturbances are not expected to cause overall impacts to resource availability for the community as the mine site and ice roads are at a substantial distance from areas of high overlapping use for goose hunting (Willow MDP Draft EIS Sections 3.11, *Birds*, and 3.16, *Subsistence and Sociocultural Systems*).

While the Colville River and CRD are the primary fishing areas for the community of Nuiqsut, a number of families travel to Fish (Uvlutuuq) Creek and stay at fish camps to set nets for broad whitefish during the summer (July and August) and fall (September and October) months (SRB&A 2010b). Other fish resources harvested along Fish (Uvlutuuq) Creek, although in lesser quantities than broad whitefish, include burbot (in winter), Dolly Varden, and Arctic grayling (SRB&A 2010b). While construction activities, noise, and infrastructure (e.g., ice roads) may temporarily block or displace fish upstream and downstream, these impacts would be relatively localized and would not be likely to affect harvesting activities that generally occur a substantial distance downstream along Fish (Uvlutuuq) Creek (Willow MDP Draft EIS Section 3.10, *Fish*). Water withdrawals to support ice infrastructure construction could alter fish habitat in some freshwater lakes, but these alterations would be temporary and are not expected to affect fish populations in Fish (Uvlutuuq) Creek (Willow MDP Draft EIS Section 3.10). Use of lakes in the alternatives analysis area for fishing is limited (see Willow MDP Draft EIS Appendix E.16). The primary potential impacts to fish resource availability would be related to real or perceived contamination of the Fish (Uvlutuuq) Creek drainage. If a spill occurs or if residents perceive that activities upstream from their fish camps are contaminating the water, they may perceive that the fish are unsafe to eat and reduce harvesting activities in the area (Willow MDP Draft EIS Section 3.16). Although unlikely, a larger oil spill could affect residents' fish harvesting in the Fish (Uvlutuuq) Creek drainage in the long term.

Several other resource uses have been documented in and around the alternatives analysis area but are not regularly documented and not considered to be primary uses of the area. These include moose hunting, eider hunting, and vegetation harvesting along Fish (Uvlutuuq) Creek. Moose are rare within the Project area, and eider hunting occurs primarily in offshore and nearshore areas of Harrison Bay. Vegetation harvesting has been documented along Fish (Uvlutuuq) Creek; however, it is unlikely that impacts to vegetation resulting from dust deposition would extend to harvesting areas downstream from the Project.

Access to Subsistence Resources

Potential impacts to harvester access are discussed in Willow MDP Draft EIS Section 3.16. A 1,000-foot safety radius around all Willow facilities would be in place and would prohibit the discharge of firearms within those areas; additionally, CPAI asks hunters not to shoot in the direction of work areas, human activity, and infrastructure. The presence of infrastructure and human activity, and associated safety considerations, would reduce the area in which residents can hunt by up to 2.5 miles, depending on the firearm being used (Willow MDP Draft EIS Section 3.16). Thus, a portion of traditional harvesting areas would be inaccessible to subsistence users from construction through the life of the Project. However, Nuiqsut subsistence users would be permitted to use most roads to access subsistence harvesting areas as long as they follow established security protocols. Gravel haul and module transport ice roads would

generally be off limits to Nuiqsut harvesters with some potential for periods of local use. Thus, while much of the Project footprint would be legally accessible to subsistence users throughout the life of the Project, certain areas, particularly during construction activities, would be inaccessible to local residents and may result in residents having to divert around infrastructure to access subsistence harvesting areas, or may act as a physical barrier or obstruction to harvester access. Additionally, the presence of humans and infrastructure would affect subsistence harvesting patterns in and around the development area due to safety concerns, thus rendering some areas unusable for subsistence purposes under certain conditions.

During much of construction, access to the Project area would be limited to overland travel or via ice roads during winter, which would be open from February to April, but would be limited to ice roads not used for gravel hauling or module transport activities. Some residents—particularly those without snow machines—may use ice roads to access caribou herds farther from the community if they are not available closer by. However, the gravel haul and module transport ice roads, which are close to the community's hunting areas, would be off limit to subsistence users, and individuals traveling by snow machine may have difficulty crossing over these ice roads safely due to high traffic volumes. While the winter is not a primary hunting time for caribou, residents do hunt this resource, particularly in February and March (SRB&A 2018a) to supplement their diet as needed throughout the winter. It is unlikely that furbearer hunters would use ice roads for wolf and wolverine hunting, as most individuals would begin snow machine hunting trips directly from the community and are not expected to hunt for these resources near human activity and infrastructure. If wolf and wolverine hunters want to cross over gravel haul and module transport ice roads to access areas farther from the community, they may experience difficulties due to the high traffic volumes and access restrictions. As gravel roads are gradually constructed, year-round access to the Project area via road automobile would increase. Gravel roads would extend the current area accessible by automobile for local residents and would likely be used, to some extent, for summer and fall caribou hunting, as well as during the winter. Use of roads would be particularly likely for residents who do not have access to alternate modes of transportation (e.g., boats, snow machines, ATVs), who have limited time to engage in subsistence activities, or who have health or other issues that make overland travel difficult.

In addition to Project roads, under Alternative B (Proponent's Project), CPAI would construct a boat ramp specifically for subsistence use in one or all of the following locations: the Ublutuoch (Tiŋmiaqsiuġvik) River, Judy (Iqalliqpik) Creek, and Fish (Uvlutuuq) Creek. Boat ramps would be accessible from existing Project roads with the addition of short access roads. Subsistence mapping data indicate limited travel along the Ublutuoch (Tiŋmiaqsiuġvik) River by boat; however, if it is possible for individuals to access Fish (Uvlutuuq) Creek via the Ublutuoch (Tiŋmiaqsiuġvik) River using boats, the boat ramps could have substantial benefits to some users. Use of Fish (Uvlutuuq) Creek for subsistence purposes has declined in recent years with residents citing fuel costs and difficult travel and navigation conditions (e.g., shallower waters near the mouth of Fish [Uvlutuuq] Creek) for the decline in use. A boat ramp that facilitates access to Fish (Uvlutuuq) Creek could increase use of this traditionally important subsistence harvesting area. Of the three proposed boat ramps, residents would be most likely to use the boat ramp closest to the community (on the Ublutuoch [Tiŋmiaqsiuġvik] River), as it would require less travel and would provide more immediate access to the lower, most heavily used portions of Fish (Uvlutuuq) Creek where most traditional camps are located. However, the boat ramps farther upriver on Fish (Uvlutuuq) and Judy (Iqalliqpik) creeks would also provide a benefit to the community, particularly in the event that the Project reduces the availability of certain resources, such as caribou, near the community. Accessing the upriver areas of Fish (Uvlutuuq) and Judy (Iqalliqpik) creeks would allow residents to access areas that are currently not frequently used due to the long boat ride from the community, high costs associated with such travel, and reported difficulties in recent years navigating into the mouth of Fish Creek by boat. Access to these areas may result in a shift to the community's boat hunting areas, but it could also provide access to new areas with greater concentrations of caribou in areas that are considered less affected by development (e.g., to the west of the current Prudhoe Bay/Kuparuk/Alpine development complex).

Recently collected data from Nuiqsut households indicate that the percentage of households using roads decreases somewhat with distance from the community, or in areas with high concentrations of drill sites. For example, while 52% of households reported using the Spur Road extending north from the community in 2018, 40% reported using the road between CD5 and GMT-1, and only 10% reported using roads crossing east of the Niġliq Channel toward the CD1 and CD4 developments (Willow MDP Draft EIS Section 3.16). Reasons for the decreased use with distance from the community could include lack of time (residents report using roads due to the ease of access during times when they are unable to take longer trip) and lack of money or fuel to take longer trips. Decreased use of roads to the east of Niġliq Channel could be due to a relatively lower abundance of resources in that area, or due to heightened concerns about safety due to the greater concentration of infrastructure and human activity. Thus, because of the greater distance of Project roads from the community and the relatively higher density of infield roads and drill pads (compared to the GMT and Alpine developments), use of Project roads may be somewhat lower than other industry roads closer to Nuiqsut. Once Project roads and infrastructure are complete, they may introduce additional concerns for residents hunting along existing roads, particularly between GMT-1 and GMT-2, as there would be fewer directions in which to shoot without consideration of human safety.

Roads would act as a physical impediment to those traveling overland, or to those traveling on or off roads to access use areas. Tundra access ramps and road pullouts at regular distances would reduce issues with off-road travel. However, some Nuiqsut hunters report difficulty crossing onto or over existing roads, even using existing tundra access ramps, particularly when hauling a heavy sled (SRB&A 2018a). While tundra access ramps would reduce impacts to access, residents may have to travel extra distances to access crossing areas if they are traversing overland. Ice roads would not include tundra access ramps but would likely have a smaller slope that would pose less of a barrier to travel; however, crossing over ice roads may be difficult due to high traffic volumes and restricted access along certain routes. The mine pits, which would be located on either side of the highly used Ublutuoch (Tiŋmiaqsiuġvik) River drainage, would also act as a physical barrier to harvesters traveling overland; residents traveling by snow machine or ATV would have to divert around the mine site during construction and in subsequent summers when the mine would fill with water. Pipelines would be placed a minimum of 7 feet above the surrounding ground surface and would generally be high enough for harvesters to cross underneath on snowmachines or ATVs, although large snow drifts may result in harvesters detouring to areas with increased clearance.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The Naval Petroleum Reserves Production Act of 1976, as amended, instructs the Secretary of the Interior to conduct oil and gas leasing in the NPR-A. Congress authorized petroleum production in 1980 and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. In 2012, the NPR-A IAP/EIS analyzed impacts of future development in and around the Alpine development, including potential development in the BTU. In 2018, BLM completed an analysis of the potential impacts of development of the GMT-2 site, including a road connecting the GMT-2 site to the existing GMT-1 site located to the northwest of Nuiqsut. The Section 810 analysis for the GMT-2 project also considered development of the BTU in its Evaluation and Findings for the Cumulative Case. The purpose of the Willow MDP EIS is to analyze impacts specific to the Willow MDP alternatives to aid in differentiation of impacts between the alternatives and to provide information to agencies and other stakeholders so that they can make informed decisions regarding the Project's development. The Project was designed to develop oil from a delineated reservoir on valid leases within the NPR-A. Other lands managed by the BLM are too distant to access the BTU reservoir using current drilling technologies.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternative A (No Action) would reduce or eliminate the use of public lands needed for subsistence purposes. However, the BLM may not select Alternative A as its preferred alternative. The BLM issued leases to CPAI and is required to allow reasonable development of those leases. The Willow MDP Draft

EIS Appendix D, Section 3.1.3, *Alternative Components Considered but Eliminated from Further Analysis*, discusses other alternatives (or alternative components) that were considered but eliminated from detailed analysis due to economic, or technological feasibility or practicability, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

d. Findings

1. **Reductions in the availability of subsistence resources described above for Alternative B may significantly restrict subsistence uses for the community of Nuiqsut.**
2. **Limitations on subsistence user access described above for Alternative B may significantly restrict subsistence uses for the community of Nuiqsut.**

Because these effects may reach the level of a significant restriction, a positive determination pursuant to ANILCA Section 810 is required at the draft stage and hearings must be held with subsistence users before final determinations (described in ANILCA Section 810(a)(2)) can be made.

This evaluation concludes that development of Willow MDP EIS Alternative B (Proponent's Project) is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource. Neither is there any expectation that there will be a major increase in the harvest of caribou by non-subsistence users. Therefore, this draft finding of "may significantly restrict" is only triggered by two other primary factors that must be considered:

1. Reduction in the availability of resources caused by alteration of their distribution
2. Limitation of access by subsistence harvesters

The rationale for these findings and the determination of significance are summarized below.

1. Rationale for the Finding of Reductions in the Availability of Subsistence Resources Under Alternative B

The Project is likely to deflect TCH caribou from areas where Nuiqsut hunters harvest them. Caribou are a resource of major importance for Nuiqsut. The majority of caribou hunting in the Project area occurs in the eastern portion of the area surrounding the proposed gravel mine site and access road. Caribou would have to cross through the Project area before being hunted in overland areas west of the community and along the Niġliq Channel and Colville River. Deflection would likely occur due to reduced habitat, roads, road traffic, aircraft traffic (overhead flights and take offs and landings), construction noise (including mining activity), drilling noise, and general human activity.

Project roads have a high potential to disturb TCH caribou. Under Alternative B, the gravel access road would bisect the fall migration corridor for a portion of the herd and would be located in an area heavily used by TCH caribou in some years, both summer and winter. According to Nuiqsut residents, roads pose both physical and visual barriers to caribou and it has been observed that changes in caribou distribution and behavior around roads results in decreased availability of caribou closer to the community. Additionally, when caribou are near roads and pads, the availability of these animals is diminished due to safety considerations as residents do not shoot toward infrastructure or areas of human activity.

Impacts related to roads, and roads collocated with pipelines, would extend beyond the Project area. Although caribou are highly mobile during mosquito and oestrid fly seasons, deflected movements and delays are more common where roads and pipelines are close to one another. Project development would result in a second set of pipelines alongside existing pipelines from the GMT-2 drill site to the Alpine development. Deflected movement and delays would also be more common when traffic rates reach and exceed 15 vehicles per hour. Project development would also increase road traffic along existing roads connecting the Project area to the existing GMT-1, CD5, and Alpine developments. These traffic rates would be more common during construction, but it is likely that caribou deflections would continue at a lower intensity during the operations phase.

The Alternative B access road would create a pinch point where it intersects with infield roads, which could deflect some caribou away from the road during the fall migration. What could be small changes in caribou distribution from a biological perspective could have large impacts on hunter success because hunters are generally limited in how far and how fast they can travel, particularly during the snow-free season. Impacts on the availability of TCH caribou would most likely occur during the summer and fall months, when caribou hunting in overland areas and along the Colville River is highest. Deflections or delays of several hours could have substantial impacts to harvesting success for residents hunting east of the road corridor, and particularly to hunters waiting along river corridors.

The location of the proposed gravel mine site could be particularly disruptive to both caribou and hunters. The site is directly west of Nuiqsut in an area commonly reached by hunters traveling overland. Although blasting and excavation would occur during winter when caribou hunting levels are lower, Nuiqsut hunters do harvest caribou in the area in winter and the presence of the mine could deflect caribou movement year-round, resulting in localized distribution changes. The mine site would fill with water after construction and thus would no longer provide habitat for caribou; the mine site would remain as a pond(s) directly overlapping an overland hunting trail that heads west from Nuiqsut.

Air traffic could cause direct and indirect disturbance to caribou availability both within and outside of the Project area. In addition to helicopter traffic throughout the analysis area, the Project would include a new airport with large fixed-wing aircraft taking off and landing directly west of Ocean Point, a common hunting area along the Colville River. Increased air traffic associated with the Project would likely affect hunting activities along the Niġliq Channel and the Colville River, upriver toward Ocean Point and in overland areas west of Nuiqsut. The increase in overall regional air traffic associated with the Project would increase the frequency of disturbances experienced by hunters. This type of disturbance would most likely occur during summer and fall when caribou would migrate in an easterly direction through the Project area into areas heavily used by Nuiqsut hunters.

Project activities, particularly during construction, would reduce the availability of furbearers in the vicinity. The Project area has been reported as being used by 88% of wolverine harvesters and 87% of wolf harvesters. The highest overlapping use areas for wolf and wolverine occur around BT1, BT2, BT3, and BT5; low to moderate use occurs around BT4. Impacts to furbearers would be highest in winter when pile driving, mine site blasting and excavation, and ice road operations would occur. These activities would displace furbearers. Residents would likely use other areas where furbearers would be more available, but hunters would likely have to travel farther with greater expense, effort, and risk, because the area west of the community is commonly used and easily accessible. While furbearers generally are not a food source for the community, furbearer hunting and trapping is a specialized activity with unique importance to Nuiqsut.

The BLM anticipates that altered distributions of the TCH caribou and furbearers would occur during construction and operation of the Project. As described above, this altered distribution could have large impacts to hunter success due to how far and fast hunters can travel and because there would be deflections or delays in caribou movement for residents to the east of the road corridor and along the Colville River, which is a high subsistence use area. BLM concludes that this would cause a major redistribution of resources that would affect the existing availability of these resources for Nuiqsut hunters.

2. Rationale for Finding of Limitations on Subsistence User Access Under Alternative B

A portion of traditional harvest areas would be inaccessible to residents during all Project phases, including land permanently overlain by infrastructure. Much of the Project area would be legally accessible, but infrastructure may act as a physical barrier or obstruction to harvester access. Subsistence users would be prohibited from discharging firearms within safety areas (1,000-foot radii surrounding oil and gas exploration, development, and transportation facilities other than roads) (CPAI 2019a, 2019b). Security protocols prohibit shooting toward infrastructure, people, work crews, equipment, and pipelines. The presence of humans and infrastructure would affect subsistence harvesting patterns in and around the

Project area due to safety concerns, rendering some areas unusable for subsistence purposes (the range common to hunting with rifles is 0.5 to 3 miles).

Ice roads used for gravel hauling would be off limits for any other use. These roads would only be present during winter construction, which is not a primary caribou hunting period. However, residents do traditionally harvest caribou in winter along overland areas on the west side of Nuiqsut, particularly in February and March, to supplement their diet.

Access to the gravel mine area may be restricted during the construction phase. The mine site would be a physical barrier to harvesters traveling overland either by snowmachine in winter or ATV in summer and fall. After construction, the mine site would be allowed to fill with water, and this would make the area inaccessible for overland travel in summer and fall.

Residents may use non-gravel haul ice roads and permanent gravel roads, once completed, to access subsistence areas. This facilitated access might provide a countervailing effect; however, use of roads declines with distance from the community. The use of Project roads may be lower than the use of roads closer to Nuiqsut (e.g., CD5, GMT-1) due to both the greater distance of Project roads from the community and the relatively high density of Project infield roads and drill sites. Industry road use is subject to standard safety rules, some of which would restrict use for some residents (e.g., no unaccompanied minors). During road construction, residents would not be able to use gravel roads and it may be difficult or impossible to cross them. Once road construction is completed, roads could be a physical impediment to overland travel; gravel roads may also prove to be difficult to gain access to or depart from to access subsistence use areas. Some Nuiqsut hunters have reported difficulty crossing existing gravel roads, even when using specifically constructed tundra/subsistence access ramps, particularly when hauling a heavy sled and in early spring when areas around roads and ramps thaw earlier than the surrounding tundra. Crossing ice roads may be restricted due to heavy traffic and other roads may have periods of overall restricted access.

The totality of limitations on subsistence access associated with the Project, particularly during the 7-year construction phase but lasting through the life of the Project, would constitute a substantial restriction on subsistence access for Nuiqsut residents.

None of these impacts is expected to affect all subsistence hunters equally, and many of these impacts are uncertain. Caribou movement is highly variable; over time, some caribou may tolerate certain sources of disturbance (Willow MDP Draft EIS Section 3.12.2.3.2, *Disturbance or Displacement*), and harvesters may adapt to changes in resource availability to some extent. However, given the importance of caribou availability and access to traditional hunting areas to Nuiqsut hunters, the BLM expects that limitations to subsistence access and the reduced resource availability anticipated to occur over the 30-year Project life, directly and indirectly attributable to Project development, would result in an extensive interference with Nuiqsut hunter access.

BLM guidance on ANILCA implementation includes relevant direction to an evaluation of subsistence impacts for the Community of Nuiqsut:

> *[T]he determination of significance must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living in a subsistence lifestyle.* (BLM Instruction Memorandum No. AK-2011-008, Appendix 6)

Nuiqsut residents have experienced limited access to their traditional subsistence lands and resources in large areas to the east, north, and west due to previous oil and gas infrastructure development, and they currently face substantial increasing development in those areas. As a result, their subsistence use areas have shifted away from developed areas. These impacts affect the relative value of remaining undeveloped land, including land that would be overlain by Project infrastructure and lands adjacent to the Project where subsistence value would decrease to Project development.

3. Evaluation and Finding for Alternative C (Disconnected Infield Roads)

The footprint for Alternative C (Disconnected Infield Roads) is similar to that of Alternative B (Proponent's Project), except there would be no gravel road between the WPF and BT1/BT2/BT4, and therefore no road and bridge crossing Judy (Iqalliqpik) Creek. This alternative would eliminate the perpendicular intersection of the access and infield roads included under Alternative B. Alternative C would also locate the WPF, WOC, and primary Project airstrip (south airstrip) approximately 5 miles to the northeast, closer to the community of Nuiqsut but into areas of lower TCH density.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The effects of Alternative C on subsistence would be similar to those described for Alternative B with two important differences:

1. Alternative C would reduce impacts to migrating caribou resulting from the elimination of the roadway "pinch point" between BT1 and the WPF and the relocation of the airstrip, WOC, and WPF into areas of lower TCH density.
2. Alternative C would increase the frequency and geographic extents of air traffic due to the need for additional air travel during the ice-free months and the addition of a second airstrip (north airstrip).
3. Alternative C would not include subsistence boat ramps on the upper Fish (Uvlutuuq) and Judy (Iqalliqpik) creeks.

Overall, Alternative C would require slightly higher levels of fixed-wing aircraft, helicopter, and ground traffic. However, ground traffic would be more concentrated in the winter months when caribou hunting activity is lower. The lack of a perpendicular road between the WPF and BT1 would decrease the potential for deflection of migrating caribou. The lack of access to the BT1/BT2/BT4 road corridor during the peak caribou hunting season would reduce ground traffic and hunting activity in that area, likely reducing deflection away from the access road and allowing caribou to move more freely along the Judy (Kayyaaq) Creek drainage. If the Project results in large-scale deflections of caribou despite the decrease in infield roads, hunters would have no summer or fall access to the BT1, BT2, and BT4 roads, nor would subsistence boat ramps on Fish (Uvlutuuq) and Judy (Iqalliqpik) creeks be constructed to mitigate effects by providing access to areas with heavier concentrations of caribou. Similar to Alternative B, Alternative C would construct a subsistence boat ramp on the Ublutuoch (Tiŋmiaqsiuġvik) River that would be more easily accessible from the community and that could provide access to key hunting areas on the lower portion of Fish (Uvlutuuq) Creek. Because the south airstrip, WOC, and WPF would be moved slightly farther east into areas of lower caribou density, impacts from air traffic may affect fewer caribou overall and could reduce deflection of caribou migrating toward the community's primary hunting area. However, moving the airstrip, WOC, and WPF closer to the community and core hunting areas may increase the frequency of disturbances to hunters related to aircraft takeoffs and landings, in addition to increased human activity. The increase in air traffic would be likely be offset by decreased ground traffic between the WPF and BT4, and lack of gravel infrastructure and associated human activity between the WPF and BT1 during the peak caribou hunting season. The long-term differences in direct impacts between Alternatives B and C are considered minimal because both alternatives would involve similar overall amounts of air and ground traffic, and both would include a year-round access road to the west of Nuiqsut's core caribou hunting grounds. However, impacts to caribou resource availability would likely be reduced under Alternative C.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation of the Willow MDP EIS Alternative C is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the Willow MDP EIS Alternative C is identical to that provided above in Section B.2.c.

d. Findings

1. Reductions in the availability of subsistence resources described above for Alternative C may significantly restrict subsistence uses for the community of Nuiqsut.

2. Limitations on subsistence user access described above for Alternative C may significantly restrict subsistence uses for the community of Nuiqsut.

Because these effects may reach the level of a significant restriction, a positive determination pursuant to ANILCA Section 810 is required at the draft stage and hearings must be held with subsistence users before final determinations (described in ANILCA Section 810(a)(2)) can be made.

This evaluation concludes that development of Willow MDP EIS Alternative C (Disconnected Infield Roads) is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource. Neither is there any expectation that there will be a major increase in the harvest of caribou by non-subsistence users. Therefore, this draft finding of "may significantly restrict" is only triggered by two other primary factors that must be considered:

1. Reduction in the availability of resources caused by alteration of their distribution
2. Limitation of access by subsistence harvesters

The rationale for these findings and the determination of significance are summarized below.

1. Rationale for the Finding of Reductions in the Availability of Subsistence Resources Under Alternative C

The rationale for the finding of reduced availability of subsistence resources under Alternative C is similar to that for Alternative B with a few distinct differences. Under Alternative C, the location of the WPF is an area with lower caribou densities, thus impacts to caribou from WPF-related traffic, activity, and noise would be somewhat reduced. The lack of subsistence hunter road access to infield roads between BT1 and BT4 may allow caribou to habituate to linear infrastructure more readily and allow caribou to establish a pattern of movement through (gravel) roadless corridor along Judy (Iqalliqpik) Creek. Ground traffic rates on these infield roads would likely be reduced during summer. Although increased air traffic would likely offset this to some degree, the reduced ground traffic may allow caribou to habituate to linear infrastructure. Overall, impacts to the disturbance of caribou under Alternative C could be reduced compared to Alternative B because more caribou may move north of the GMT-2-WPF access road due to the roadless corridor along Judy (Iqalliqpik) Creek. Currently, the majority of caribou hunting occurs in the eastern portion of the Project area near the proposed gravel mine and access road. Once this area is disturbed, the area north of the access road may have more caribou; however, restrictions on shooting toward pipelines would limit the actual availability of caribou hunting in the area.

Overall, despite the potential for reduced disturbance to caribou under Alternative C, the BLM expects that altered distributions of TCH caribou and furbearers would occur during the Project's construction and operations phases. This altered distribution could have large impacts to hunter success due to how far and fast hunters can travel and because there would be deflections or delays in caribou movement for residents east of the road corridor and along the Colville River, which is a high subsistence use area. The BLM concludes that this would cause a major redistribution of resources that would affect the existing availability of these resources for Nuiqsut hunters.

2. Rationale for the Finding of Limitations on Subsistence User Access Under Alternative C

The rationale for the determination that interference with subsistence access would be extensive under Alternative C is identical to the rationale provided for under Alternative B (Section B.2.d.2) with the exception that under Alternative C, residents of Nuiqsut would not have all-season road access to the infield roads between BT1 and BT4.

4. Evaluation and Finding for Alternative D (Disconnected Access)

The footprint for Alternative D (Disconnected Access) is similar to that of Alternative B except there would be no gravel access road connection between the Project area and the GMT-2 and Alpine developments. Under this alternative, transportation to the Project area would be exclusively by aircraft for approximately 9 months of the year (May through January) and primarily via ice road for 3 months of the year (February through April). Gravel roads would connect the WPF, which would be colocated with BT3, to the other four drill sites and Project infrastructure. This alternative would reduce linear infrastructure on the landscape with the goal of reducing impacts to migrating caribou.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The effects of Alternative D on subsistence would be like those described for Alternative B with one important difference: Alternative D would reduce impacts to migrating caribou resulting from the elimination of the gravel access road connecting the Project to the GMT-2 and Alpine developments. Overall, Alternative D would require higher levels of fixed-wing aircraft and helicopter traffic resulting from the lack of year-round road access to the Project. On average, the increase in air traffic would amount to one or two additional fixed-wing aircraft trips per day for the life of the Project (32 years) and one additional helicopter trip per week during the drilling and operations phases; these trips would be more concentrated during the 9 months when there would be no ice road access. The increase in air traffic could result in a greater frequency of air traffic disturbances to caribou, resulting in decreased harvest success for Nuiqsut hunters during individual hunting trips. The lack of a gravel access road running perpendicular to the fall migration route, in addition to the lack of ground traffic in that area throughout the summer and fall, would decrease the potential for deflection of caribou migrating through the Project area in the fall, or disturbance of caribou that occur in the area in the summer.

The lack of a year-round gravel access road under Alternative D means Nuiqsut residents would not have the benefit of access to the Project area via road for hunting. However, it is unclear how much residents would use the Project road system given its distance from the community and the somewhat higher concentration of drill sites; some evidence shows decreased use of roads with increased distance from the community or in more densely developed areas (Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*). Residents would still be able to use the road system to reach GMT-2 and hunt from those roads by ATV or snow machine. In addition, under Alternative D, there would no subsistence boat ramps on Fish (Uvlutuuq) and Judy (Iqalliqpik) creeks to mitigate larger-scale deflections of caribou if they continue to occur despite the decrease in road infrastructure. Similar to Alternative B, Alternative D would construct a subsistence boat ramp on the Ublutuoch (Tiŋmiaqsiuġvik) River that would be more easily accessible from the community and that could provide access to key hunting areas on the lower portion of Fish (Uvlutuuq) Creek.

Per the Willow MDP Draft EIS, Alternative D may result in less impacts on caribou availability due to the lack of a year-round access road. While air traffic levels would be somewhat higher, air traffic generally causes localized disturbances whereas roads can cause larger effects on caribou movement and distribution, in addition to changes in caribou hunting patterns. Across the 10 years of the Nuiqsut Caribou Subsistence Monitoring Project and as development activity has increased in the vicinity of Nuiqsut, reports of air traffic impacts have remained somewhat stable, while reports of impacts related to human-made structures have increased. In addition, avoidance behavior and changes in hunting patterns have been more evident since construction of roads in the area (SRB&A 2019). Thus, it is likely that while the increase in air traffic would contribute to existing impacts to hunters, additional road infrastructure to the west of the community would substantially increase impacts to resource availability and hunter access. By eliminating a large portion of year-round road infrastructure to the west of the community, Alternative D would reduce deflection of caribou as they migrate toward Nuiqsut's core hunting grounds to the west of the community. Additionally, while the Project area would not be road-accessible year-round for Nuiqsut hunters, they would likely still continue to use existing roads and hunt in the area between GMT-2 and the Project area.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation of the Willow MDP EIS Alternative D is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the Willow MDP EIS Alternative D is identical to that provided above in Section B.2.c.

d. Findings

1. **Reductions in the availability of subsistence resources described above for Alternative D may significantly restrict subsistence uses for the community of Nuiqsut.**
2. **Limitations on subsistence user access described above for Alternative D may significantly restrict subsistence uses for the community of Nuiqsut.**

Because these effects may reach the level of a significant restriction, a positive determination pursuant to ANILCA Section 810 is required at the draft stage and hearings must be held with subsistence users before final determinations (described in ANILCA Section 810(a)(2)) can be made.

This evaluation concludes that development of Willow MDP EIS Alternative D (Disconnected Access) is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource. Neither is there any expectation that there will be a major increase in the harvest of caribou by non-subsistence users. Therefore, this draft finding of "may significantly restrict" is only triggered by two other primary factors that must be considered:

1. Reduction in the availability of resources caused by alteration of their distribution
2. Limitation of access by subsistence harvesters

The rationale for these findings and the determination of significance are summarized below. The rationale for these findings is similar to those described above for Alternative B (Section B.2.d, *Findings*) with key differences summarized below.

1. Rationale for the Finding of Reductions in the Availability of Subsistence Resources Under Alternative D

Alternative D may result in fewer impacts on caribou availability than Alternative B due to the lack of a year-round gravel access road connecting the Project to existing development (e.g., GMT-2, Alpine); however, the BLM still anticipates a major redistribution of resources would occur under this alternative. The lack of a gravel-access road alignment being perpendicular to the fall caribou migration and the lack of ground traffic in that area throughout the summer and fall would decrease the potential for deflection of caribou migrating through the area. Higher levels of fixed-wing aircraft and helicopter traffic resulting from the lack of year-round access would overlap with peak caribou hunting months, which could result in a greater frequency of air traffic disturbances to caribou, resulting in decreased harvester success for Nuiqsut hunters during individual hunting trips. The increase in air traffic would likely not be enough to outweigh the benefits of reduced deflection of caribou as they migrate toward Nuiqsut's hunting grounds to the west of the community. While air-traffic volumes would be somewhat higher, air traffic generally causes localized disturbances whereas roads can cause larger effects on caribou movement and distribution.

Many benefits of reduced deflection from the lack of an access road would be offset by the aircraft traffic (including take offs and landings of large fixed-wing aircraft) in addition to the combined effects of a linear pipeline along the route between GMT-2 and the Project, parallel pipeline racks between GMT-2 and Alpine facilities, Project infield roads, drill sites, and the WPF, the location of and activity at the gravel mine site, and other disturbances described above for Alternative B.

2. Rationale for the Finding of Limitations on Subsistence User Access Under Alternative D

The rationale for the determination that interference with subsistence access would be extensive under Alternative D is similar to the rationale provided for Alternative B with the exception that the lack of a

year-round access road under Alternative D means that Nuiqsut residents would not have the potential benefit of access to the project area via road vehicle for hunting. It is unclear how much residents would use the Willow MPD road system given its distance from the community and the somewhat higher concentration of drill sites; some evidence shows decreased use of roads with distance from the community or in more densely developed areas (Willow MDP Draft EIS Section 3.17). Alternative D would reduce limitations on overland travel but restrict access via roads. Residents would still be able to use the road system to GMT-2 and hunt off of those roads by four-wheeler or snowmachine. Limitations to access described above for Alternative B resulting from direct overlap with subsistence use areas, safety areas around sites, road use guidelines, security protocols restricting shooting, and gravel haul ice roads would be similar under Alternative D.

5. Evaluation and Finding for Module Delivery Option 1 (Atigaru Point Module Transfer Island)

Module delivery Option 1 (Atigaru Point Module Transfer Island), would include construction of an MTI near Atigaru Point to support sealift module delivery to the Project. Module delivery by sealift barge to the MTI would occur over two summers; the modules would be stored on the MTI and then transported from the MTI to the WPF via an ice road. Gravel would be hauled from the Tiŋmiaqsiuġvik mine site via ice road to the MTI site for construction. During construction, the MTI would house facilities such as an office, break room, and helipad; a temporary 100-person work camp would be located onshore near Atigaru Point. Construction facilities and supplies would be demobilized once construction was complete.

In the Willow MDP Draft EIS, the BLM analyzed potential direct impacts on subsistence based on a 2.5-mile buffer of permanent and temporary infrastructure, including the MTIs and associated module transport and gravel haul ice roads, for each module delivery option (module delivery option analysis area). While the MTI-associated activities would occur solely during the construction phase of the Project, the MTIs themselves would remain after module transport was complete. Differences in impacts between the construction and operation phases are discussed qualitatively. The module delivery option analysis areas do not include all areas where development-related activity (e.g., vessel traffic) or impacts would occur. The analysis area allows for more detailed analysis of the area where subsistence users are most likely to experience direct impacts from the Project. Additional direct and indirect impacts that would occur outside the analysis area are also addressed.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis area for module delivery Option 1 (Figure 6) lies within areas heavily used by Nuiqsut residents for subsistence. Between 1995 and 2006, a substantial proportion of Nuiqsut harvesters reported using the analysis area for harvesting of caribou, wolverine, and wolf (over 80% of harvesters each); and goose (over 50% of harvesters). These resources are harvested primarily in overland areas crossed by ice roads, particularly where the gravel haul ice road crosses Fish (Uvlutuuq) Creek and terminates at the mine site (Figures 7 through 10). Between 2008 and 2016, the percentage of caribou harvesters using the analysis area for Option 1 ranged from 33% to 78%; caribou harvests within the area ranged from 4% to 11% of the total harvest during individual study years. Nuiqsut harvesters also use the offshore area in Harrison Bay surrounding the MTI for subsistence harvesting of bearded seal (33% of harvesters), ringed seal (26%), and eider (14%). Uses of the area directly to the east of the analysis area for these resources are higher (Figure 11). Eleven percent of Utqiaġvik harvesters reported using the Option 1 analysis area, primarily for wolf and wolverine, during the 1997 to 2006 time period (Figure 12). While the bowhead whale hunt is a culturally important subsistence activity and provides a large portion of the Nuiqsut's annual subsistence harvest, the community's whale hunting activities occur a substantial distance east of the potentially affected area, near Cross Island. Thus, impacts to bowhead whale hunting associated with the Project are unlikely.

As discussed in Section B.2.a, both caribou and wolf and wolverine are key resources to the community of Nuiqsut, and the analysis area is heavily used by both caribou and furbearer hunters in Nuiqsut. Other

resources of major cultural and/or material importance harvested within the Option 1 analysis area include white-fronted goose and bearded seal (Table E.16.9 in Willow MDP Draft EIS Appendix E.16, *Subsistence Technical Appendix*). Thus, impacts to subsistence activities related to caribou, wolf, wolverine, goose, and seal are considered in the ANILCA Section 810 evaluation of module delivery Option 1. The analysis area for Option 1 is on the eastern periphery of Utqiaġvik subsistence use areas for wolf and wolverine but is directly east of the Teshekpuk Lake area, which is a key traditional use area for many Utqiaġvik residents and includes areas of moderate to high overlapping subsistence use. Moderate overlapping subsistence use also occurs to the southwest of the Project toward Ikpikpuk River, which is a key subsistence drainage for the community of Utqiaġvik (Willow MDP Draft EIS Figure 3.16.4). Caribou are also harvested to the west of the Project; however, the analysis area is on the eastern periphery of the herd's range and is not expected to alter caribou migration routes to the extent that they would affect Utqiaġvik harvesting activities to the west. Thus, the ANILCA Section 810 evaluation for module delivery Option 1 focuses on impacts to furbearer harvesting for Utqiaġvik. As discussed in Section B.2.a, furbearer hunting does not provide substantial amounts in terms of food but is a specialized and culturally important activity that contributes to the local economy.

Option 1: Proponent's Module Transfer Island

Option 2: Point Lonely Module Transfer Island

Willow Proposed Development Features

- Module Transport Analysis
- Ice Road
- Gravel Footprint

Land Designation

- National Petroleum Reserve in Alaska

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

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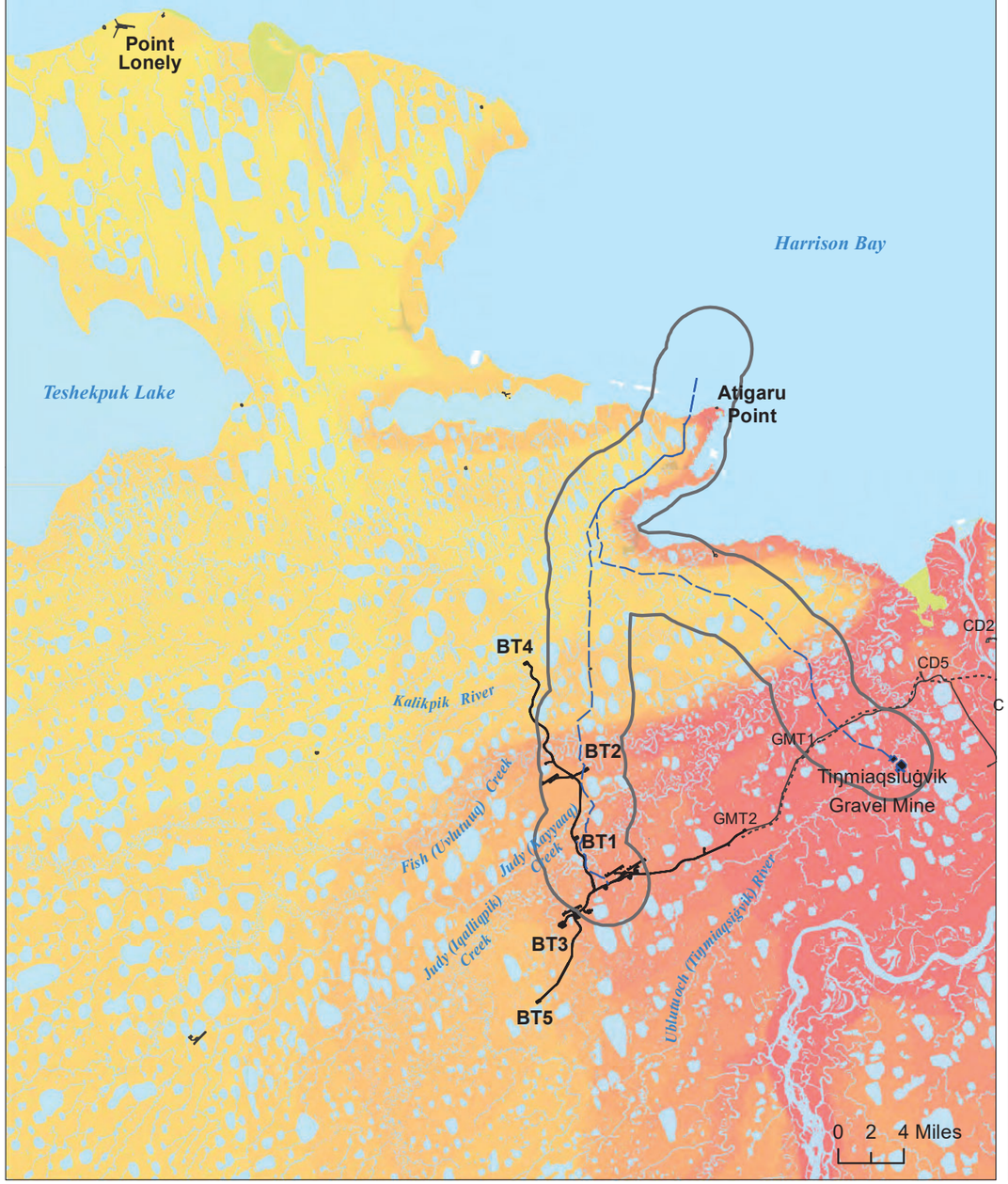
Figure 6

Option 1: Proponent's Module Transfer Island



Option 2: Point Lonely Module Transfer Island

Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Caribou, 1995-2006 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
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Source
a. SRB&A 2010a

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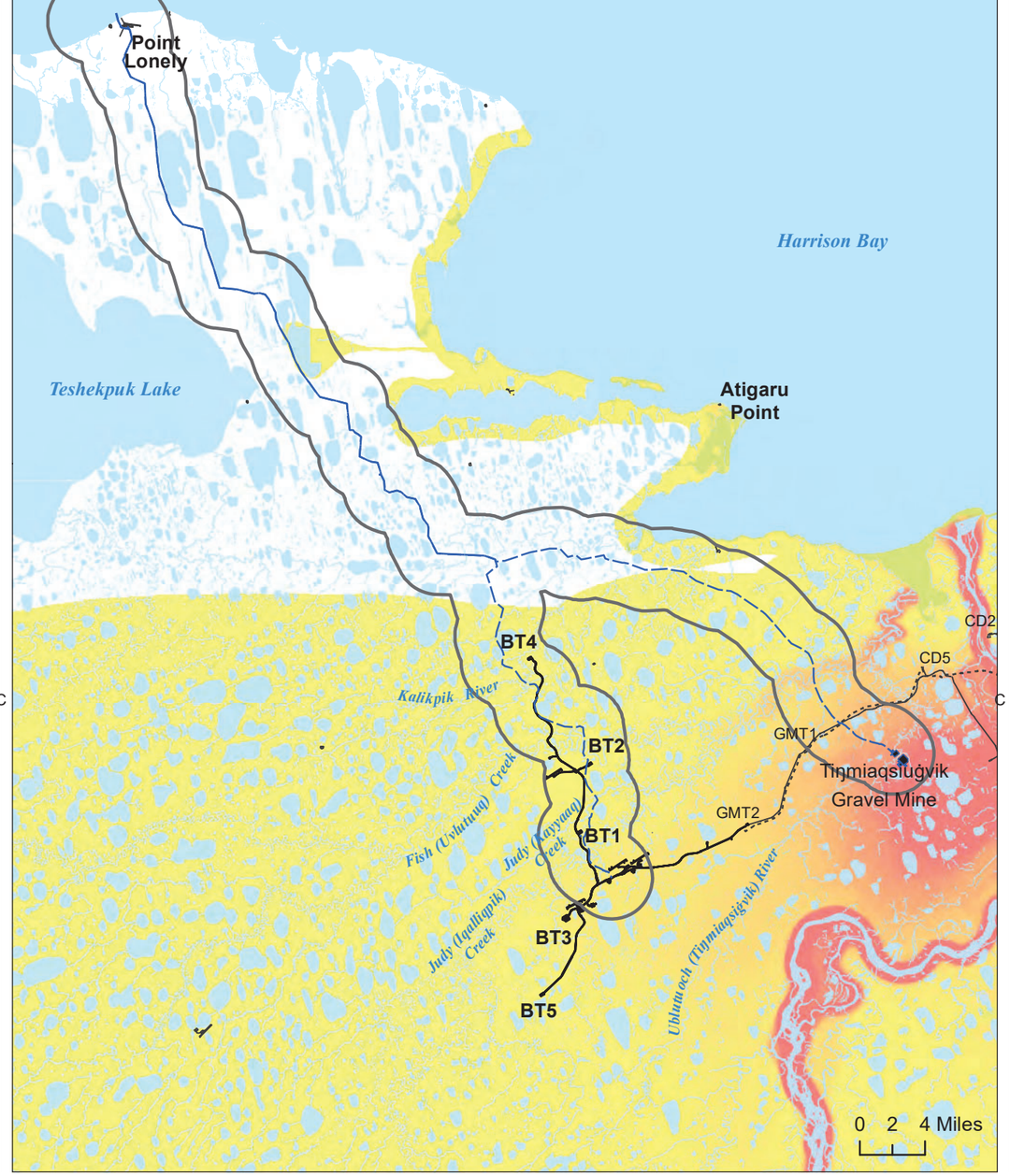
Figure 7

Option 1: Proponent's Module Transfer Island

Option 2: Point Lonely Module Transfer Island



Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Caribou, January 2008 through October 2016 [a] (High / Low)
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
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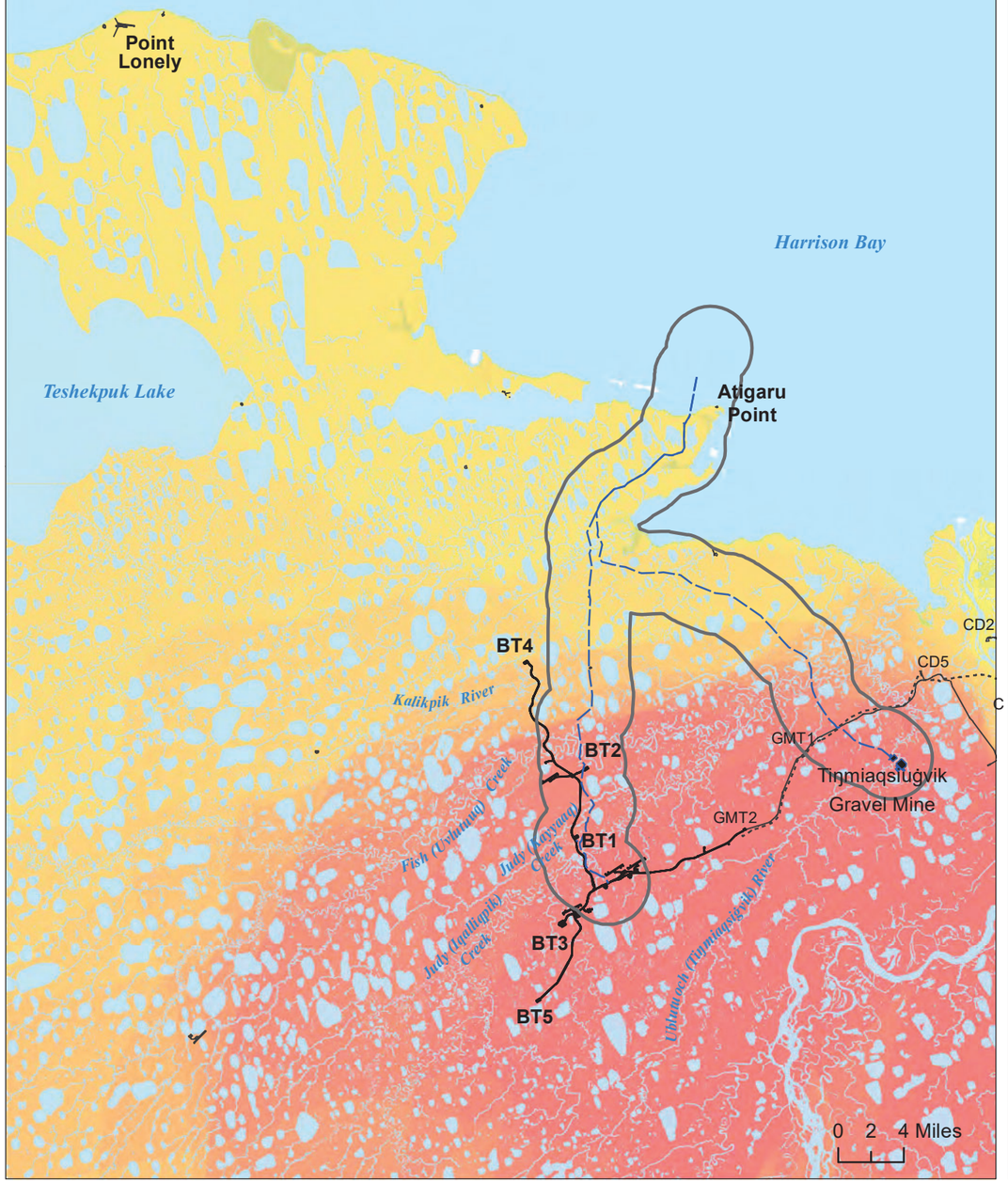
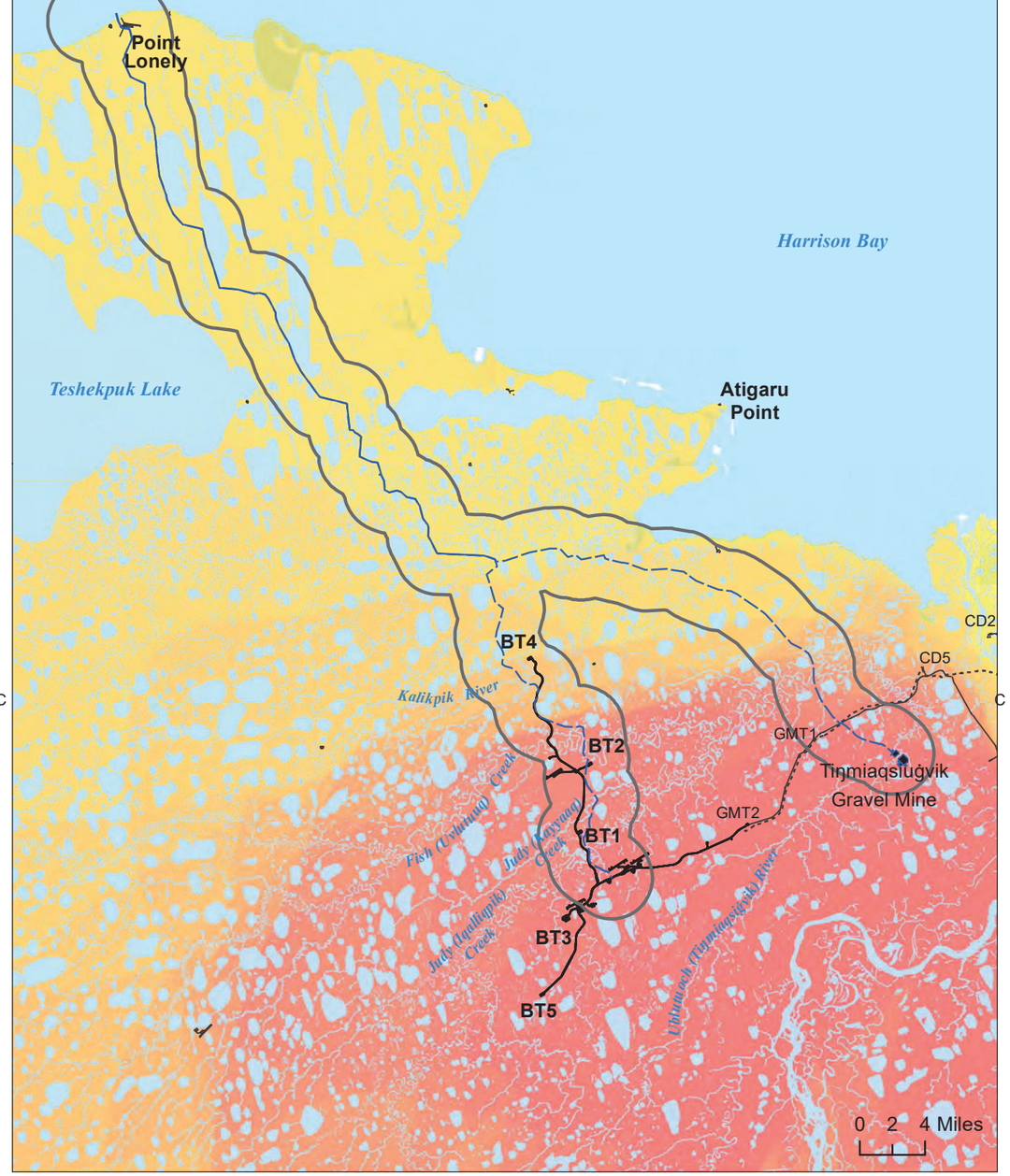
Figure 8

Option 1: Proponent's Module Transfer Island



Option 2: Point Lonely Module Transfer Island



Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006 [a] (High / Low)
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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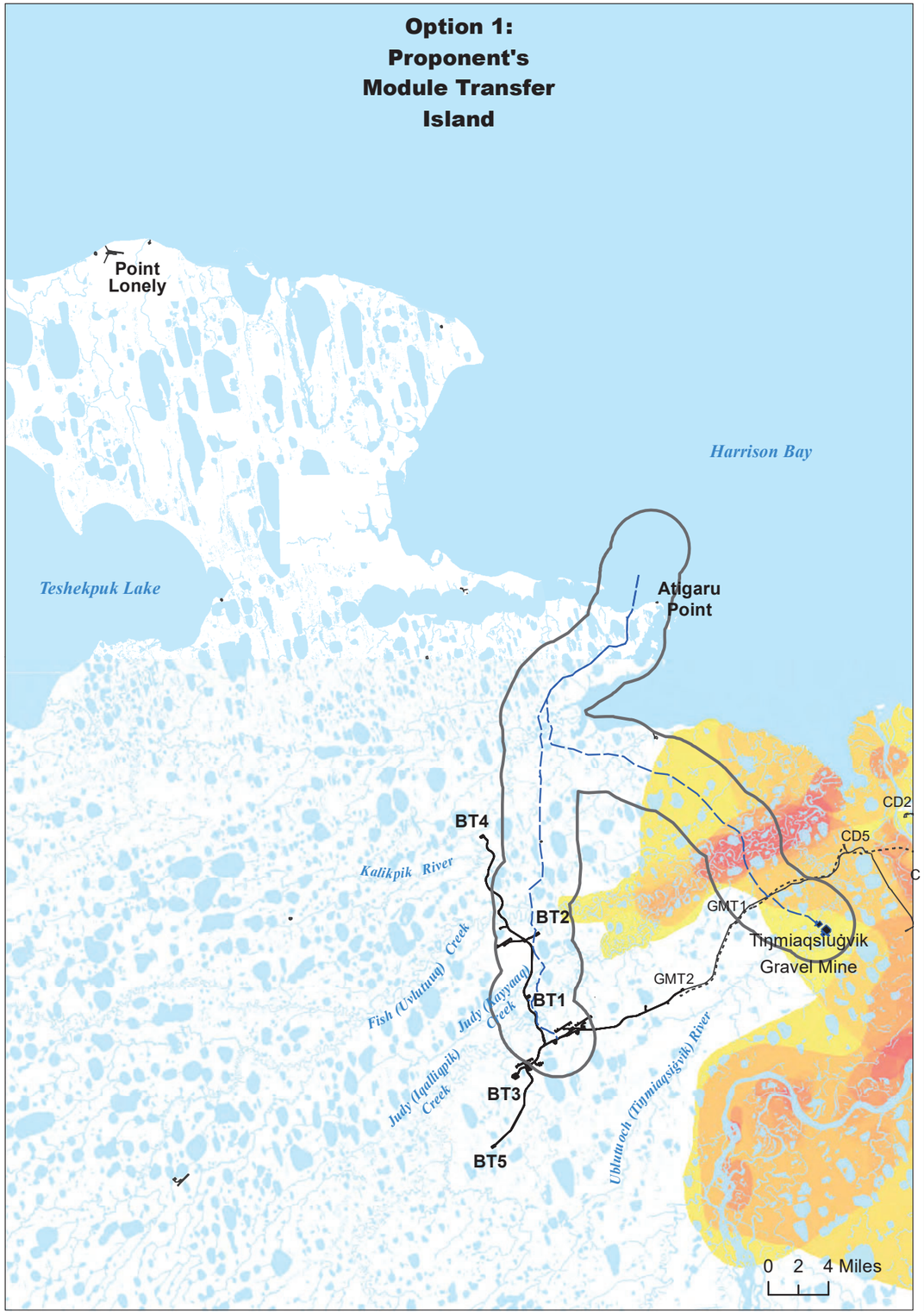
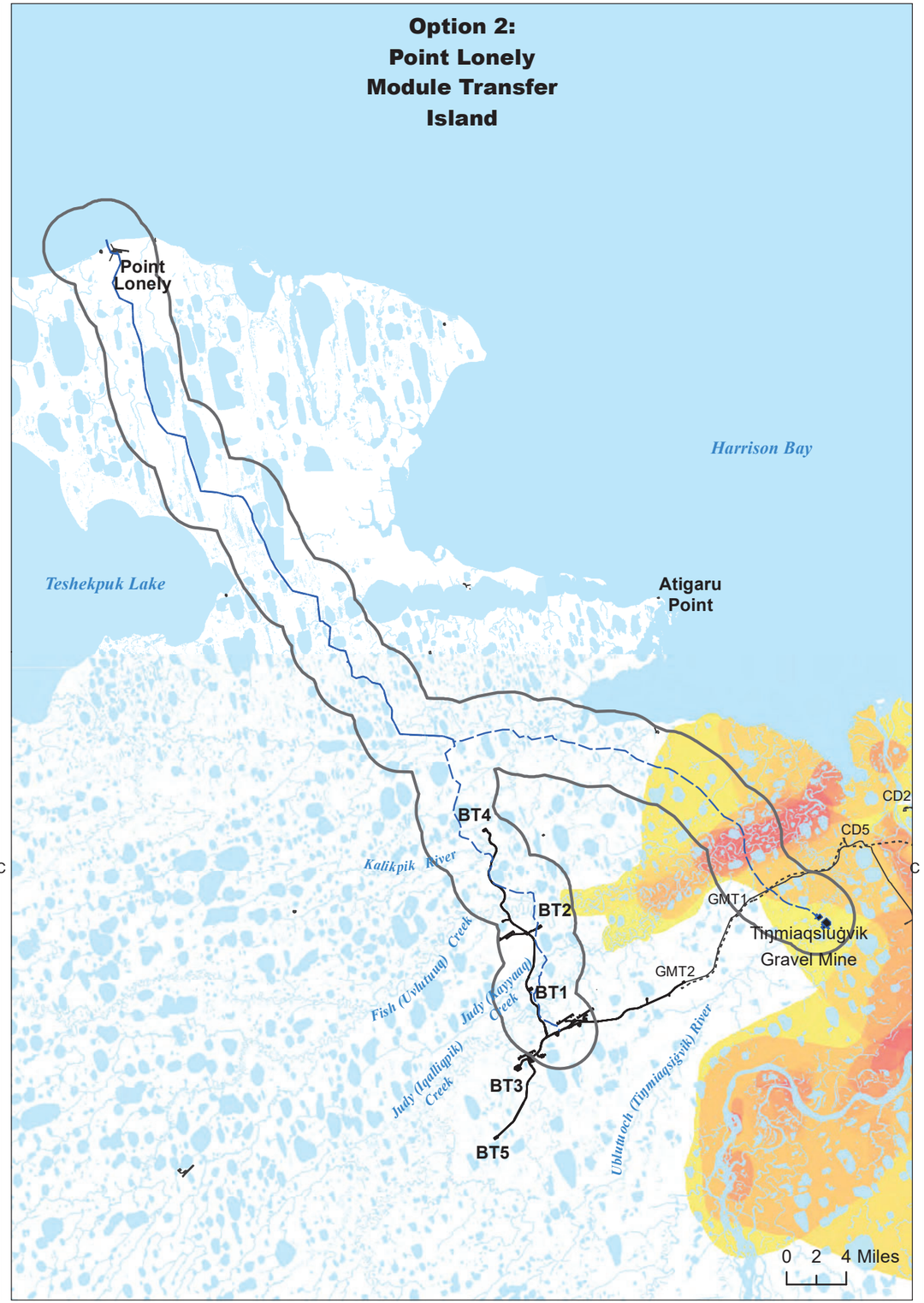
Figure 9

Option 1: Proponent's Module Transfer Island



Option 2: Point Lonely Module Transfer Island



Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Goose, 1995-2006 [a] (High / Low)
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
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Source
a. SRB&A 2010a

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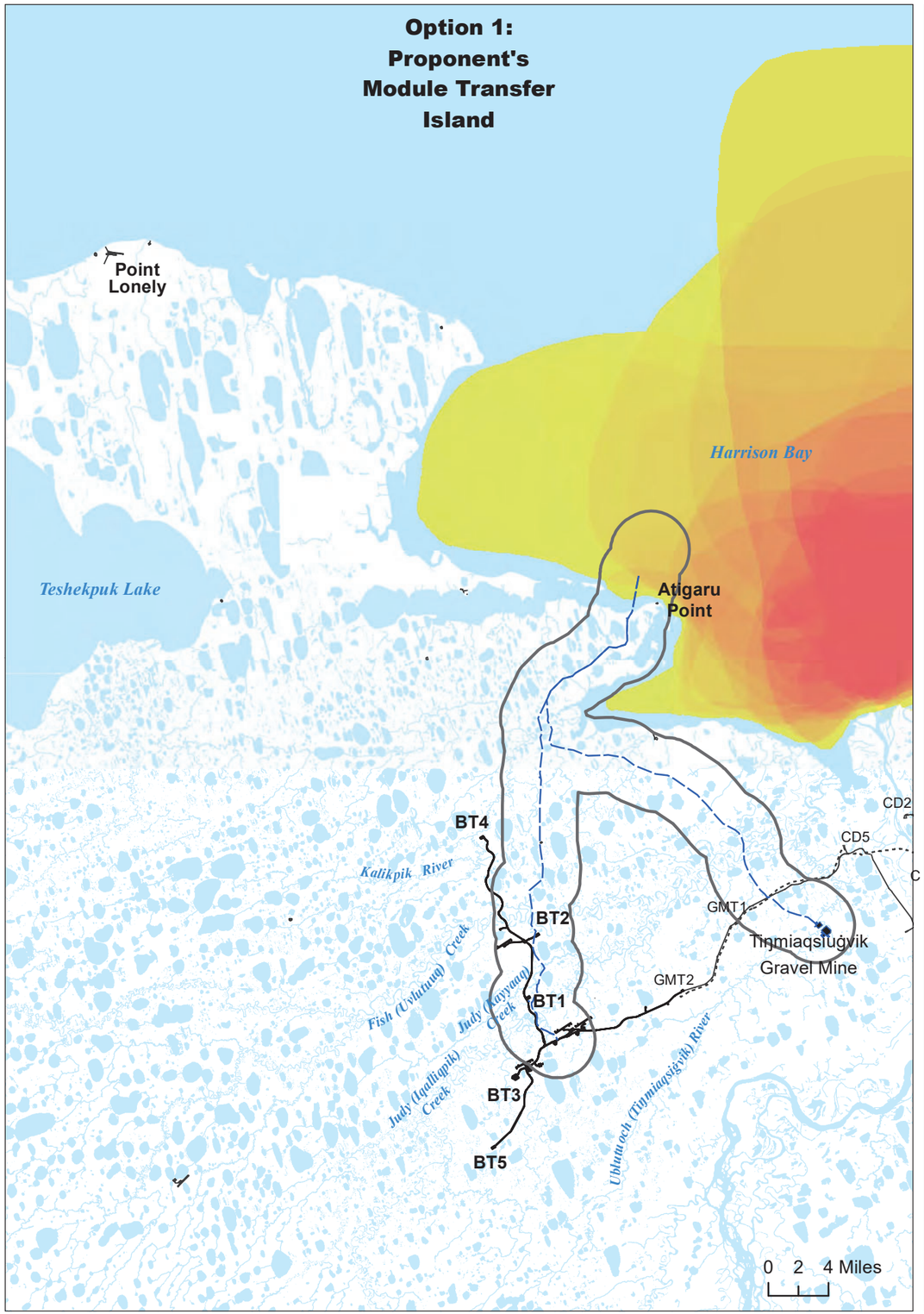
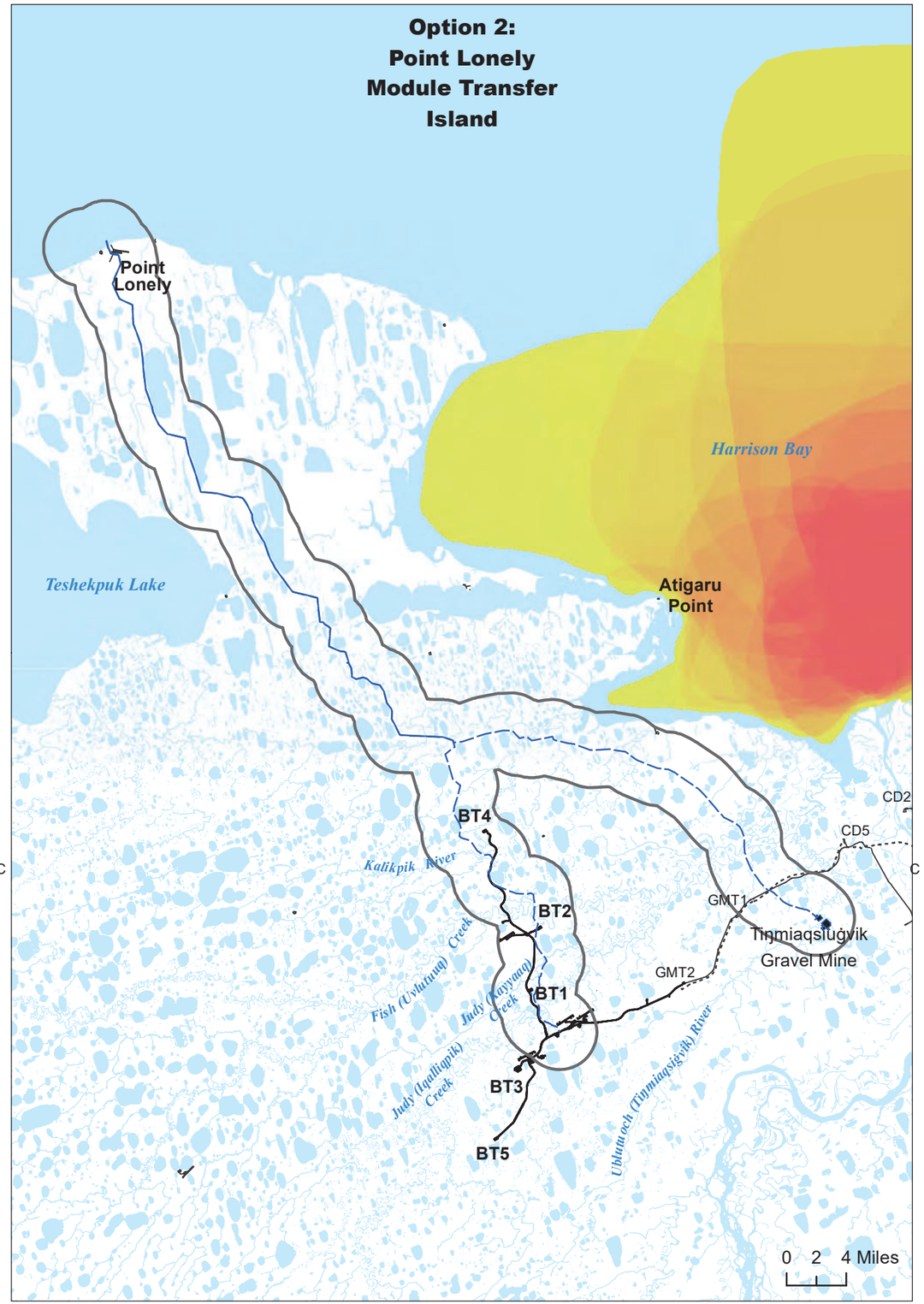
Figure 10

Option 1: Proponent's Module Transfer Island



Option 2: Point Lonely Module Transfer Island



Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Bearded and Ringed Seal, 1995-2006 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
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Source
a. SRB&A 2010a

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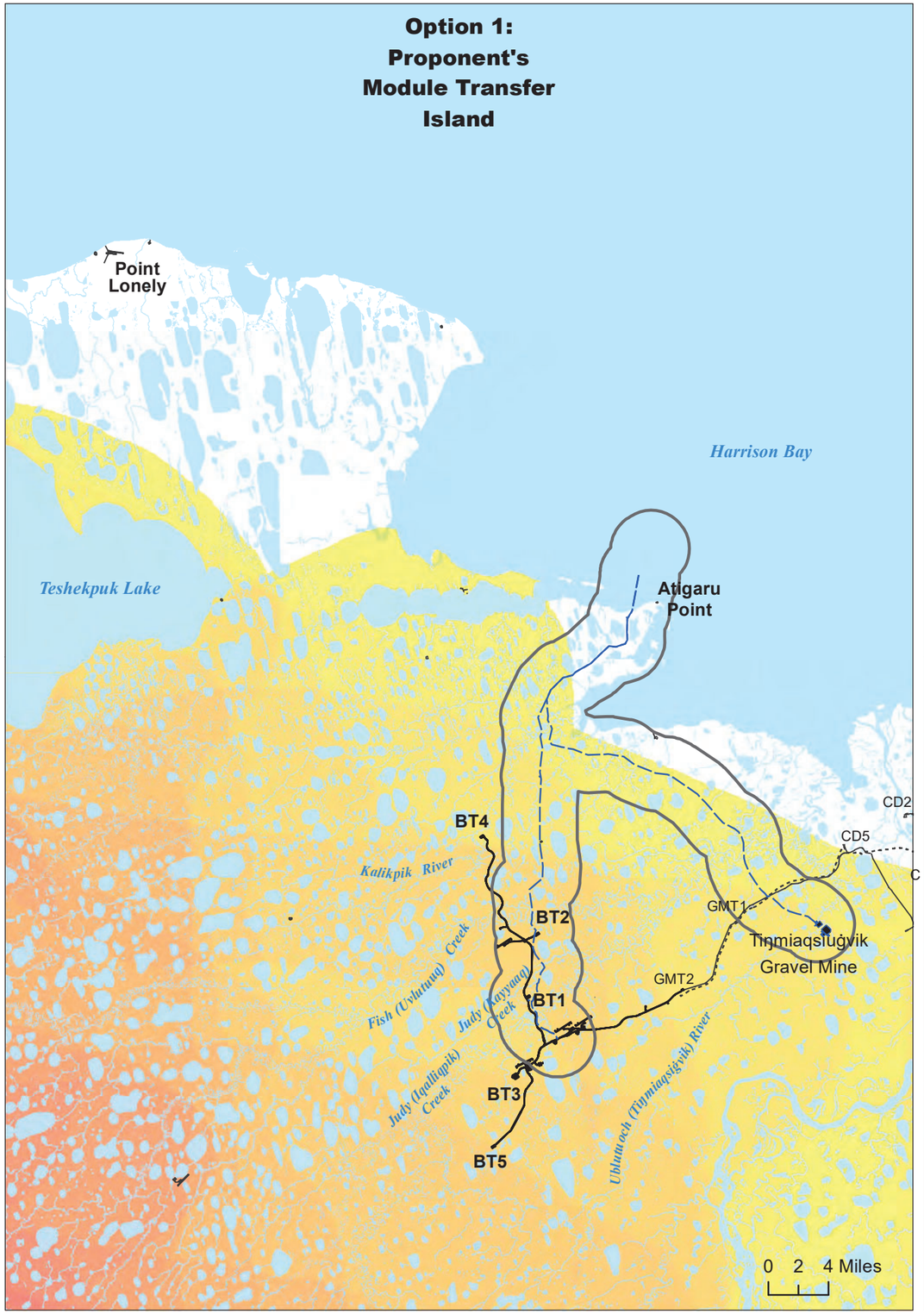
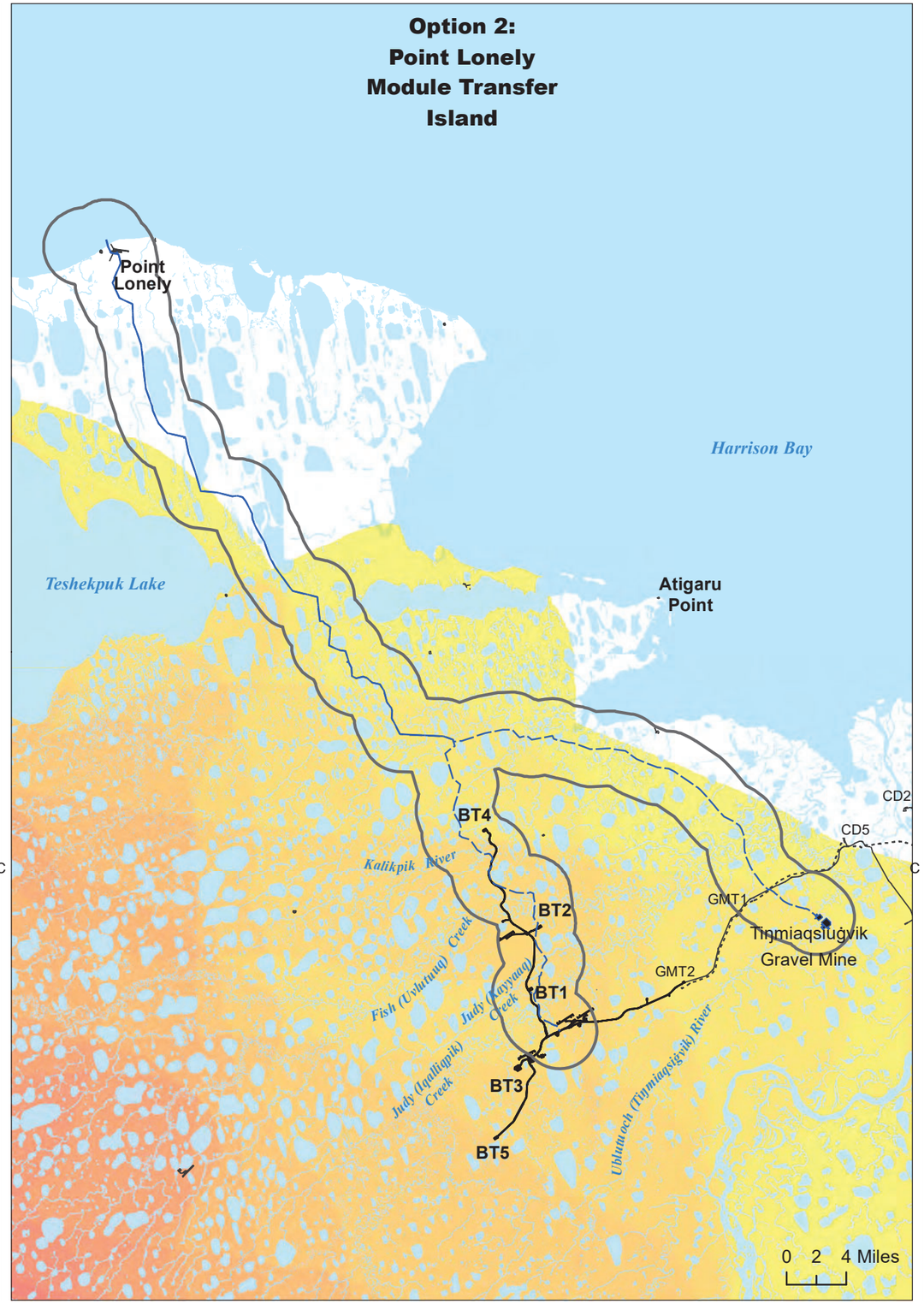
Figure 11

Option 1: Proponent's Module Transfer Island



Option 2: Point Lonely Module Transfer Island



Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Wolf and Wolverine, 1997-2008 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 12

Subsistence Resource Abundance

While construction activities associated with the MTI, including ice roads, would result in the temporary removal or disturbance of habitat for some resources and could cause direct mortality to individual animals, these are not expected to have population level effects on subsistence resources. Terrestrial mammals, including caribou, generally do not use sea ice habitat and therefore would not be directly affected by the MTI. Ice roads associated with the MTI occur within the TCH range but would be in an area of relatively low calving density (Willow MDP Draft EIS Section 3.12, *Terrestrial Mammals*). Traffic along ice roads, which would exceed 15 vehicles per hour during construction, could result in collisions and direct mortality of individual animals such as caribou. The area is not heavily used by caribou in winter and does not have a high density of wolf or wolverine; thus, the abundance of caribou, wolf, and wolverine available for subsistence use would not be impacted under module delivery Option 1.

While goose habitat occurs throughout the analysis area and could experience degradation or alteration, these changes are not expected to affect overall bird abundance. Individual mortalities could occur as a result of collisions with aircraft, vehicles, and infrastructure, but would not cause population-level effects (Willow MDP Draft EIS Section 3.11, *Birds*). Construction of the MTI would result in the direct loss of 12 acres of habitat for seals but is not expected to cause population-level effects to seals (Willow MDP Draft EIS Section 3.13, *Marine Mammals*). Fish, particularly broad whitefish, are harvested downstream from the proposed ice road crossing of Fish (Uvlutuuq) Creek. Nuiqsut residents generally do not harvest fish in Harrison Bay, but instead harvest them from river drainages. Water withdrawals for ice infrastructure could alter fish habitat but these alterations would be temporary and are not expected to affect fish populations in Fish (Uvlutuuq) Creek (Willow MDP Draft EIS Section 3.10, *Fish*). A large oil spill could have larger population-level effects to resource abundance, but such a spill is not expected to occur in association with the MTI or associated barging or ice road traffic (Willow MDP Draft EIS Sections 3.10, 3.11, and 3.13). Thus, the abundance of goose, seal, or fish available for subsistence use would not be impacted under module delivery Option 1.

Subsistence Resource Availability

A description of subsistence uses for Nuiqsut and Utqiaġvik is provided in Willow MDP Draft EIS Section 3.16.1, *Affected Environment,* and in Willow MDP Draft EIS Appendix E.16, *Subsistence Technical Appendix*. As noted above, use of the Option 1 analysis area for caribou hunting primarily occurs in the vicinity of ice roads—particularly gravel haul ice roads—associated with the MTI. The gravel haul ice road extending from the Tiŋmiaqsiuġvik mine site to Fish (Uvlutuuq) Creek occurs in areas of high overlapping use for Nuiqsut caribou hunting. Hunting along Fish Creek occurs by boat in the summer months; however, overland travel during the winter and summer months also occurs in the area between the mine site and Fish Creek. Hunting along Fish Creek by boat in the summer continues to be an important subsistence activity but the frequency has decreased in recent years; reasons for the decrease in use include difficulty accessing the mouth of Fish Creek due to increasingly shallow waters in nearshore areas near the mouth of the creek, and the high costs associated with traveling to Fish Creek via Harrison Bay (SRB&A 2019). Subsistence boat ramps constructed as part of the Project may increase use of the Fish (Uvlutuuq) Creek area during the summer months. The overland area toward Fish Creek remains a heavily used area by the community of Nuiqsut during the summer and fall caribou hunting season and is primarily accessed by ATV, although residents increasingly access the area by truck along the road system. When traveling by ATV, residents can generally travel as far west as the Ublutuoch (Tiŋmiaqsiuġvik) River; however, access to the road system also allows residents to haul ATVs and travel farther toward Fish (Uvlutuuq) Creek than previously possible. Residents also hunt in coastal areas of Harrison Bay during the summer, with Atigaru Point being an important traditional hunting area where residents target TCH caribou during the insect relief season. In recent years, use of this area has decreased as a result of increased sedimentation and shallow waters along the coast, in addition to a reported decrease in the availability of caribou in the area (Willow MDP Draft EIS Section 3.16) (SRB&A 2018a).

Wolf and wolverine hunting within the Option 1 analysis area, particularly in the southern portions of the gravel haul and module transport ice roads, is similar to that described in Section B.2.a, *Evaluation of the*

Effects of Use, Occupancy, or Disposition on Subsistence Uses and Needs (*Subsistence Resource Availability, Displacement of Furbearers*), and occurs primarily in the winter months to the west, south, and southeast of the Nuiqsut. Hunting of wolf and wolverine is less common in the northern portion of the Option 1 analysis area (Figure 10). For Utqiaġvik, wolf and wolverine hunting occurs primarily around the module transport ice road but extends throughout the southern portion of the analysis area (Figure 12).

Goose hunting in the Option1 analysis area occurs most commonly in areas where the gravel haul ice road intersects with Fish (Uvlutuuq) Creek but also to the north and east of the Tiŋmiaqsiuġvik gravel mine site. Most goose hunting along Fish Creek and in overland areas occurs by snow machine in the months of April and May (Willow MDP Draft EIS Appendix E.16). Seal hunting by Nuiqsut residents occurs throughout Harrison Bay by boat, with moderate overlapping use offshore from Atigaru Point; high overlapping use occurs directly east of Atigaru Point in Harrison Bay. Seal hunting peaks in the months of July and August (Willow MDP Draft EIS Appendix E.16).

Noise and traffic associated with the gravel haul and module transport ice roads, and the physical presence of the ice roads themselves, could affect the availability of caribou, wolf, wolverine, and goose for Nuiqsut harvesters, and the availability of wolf and wolverine for Utqiaġvik harvesters. Depending on annual conditions, ice roads may still be present in late April, when goose hunting along Fish (Uvlutuuq) Creek intensifies (Figure E.16.1 in Appendix E.16); thus, goose hunters could experience direct hunting impacts while the gravel haul ice road is operational. This would only occur during a single winter ice road season when gravel haul to the MTI would take place. See Section B.2.a, *Evaluation of the Effects of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Subsistence Resource Availability*), for a discussion of how roads and associated road traffic may affect the availability of caribou, furbearers, and other resources. Because MTI gravel haul and module transport ice roads would not be present during the fall caribou migration, it is unlikely they would cause overall changes in caribou distribution or migration; however, caribou may be deflected from ice roads in winter during times of heavy road traffic, affecting resource availability for caribou harvesters. Peak ground traffic levels associated with the MTI would reach up to 121 trips per hour in the winter and could have a high potential for disturbance. If ice roads are still in place and operational at the beginning of the waterfowl hunting season in mid-to-late April, residents may experience decreased harvesting success during this time for the single season during which the gravel haul ice road would be operational. Geese may be more easily disturbed or temporarily displaced due to traffic and noise, resulting in residents having greater difficulty hunting them.

Noise and human activity associated with construction of the MTI, which would occur during both the winter and summer seasons, could temporarily displace seals, periodically resulting in reduced harvest success for Nuiqsut seal hunters in the MTI area during the summer months. Vessel traffic between the MTI and Oliktok Point, which would occur throughout the open water season, may also cause temporary and periodic displacement of seals that could temporarily affect harvester success. The Project would require a total of nine sealift barges over the course of two delivery seasons; support vessel traffic would be much higher (an estimated 265 support vessels over the course of three open-water seasons). The presence of the MTI could also affect the distribution of marine mammals within the immediate area of the island (Willow MDP Draft EIS Section 3.13, *Marine Mammals*). However, noise and infrastructure related to MTI construction would not be likely to cause overall impacts to resource availability as most displacement would be temporary and localized; other suitable seal habitat would be available nearby, and residents would likely avoid areas where immediate disturbance is likely (e.g., around barges, support vessels, and the MTI during times of high activity) (Willow MDP Draft EIS Section 3.13). Noise and human activity at the MTI may also affect the availability of caribou along the coast during the summer; however, as discussed above, use of the coastal area in Harrison Bay has been limited in recent years due to access difficulties. Between 2008 and 2016, the Coastal West area has accounted for between zero and 2% of the total harvest (SRB&A 2018a); thus, disruptions to caribou in this area would not likely affect overall resource availability for the Nuiqsut.

The Project would require additional fixed-wing aircraft and helicopter traffic to support module delivery Option 1. Most of this traffic would occur between Alpine and Willow. Potential impacts to resource

availability related to air traffic are discussed in Section B.2.a, *Evaluation of the Effects of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Subsistence Resource Availability*).

Access to Subsistence Resources

Potential impacts to harvester access are discussed in Willow MDP Draft EIS Section 3.16. Subsistence users would likely be prohibited from accessing the MTI area while it is under construction and operational, and the MTI would likely remain a gravel barrier island after decommissioning. Changes to coastal areas resulting from erosion and sedimentation around Atigaru Point is a key concern voiced by Nuiqsut residents who already have reported difficulty accessing nearshore areas in Harrison Bay in recent years. If construction of the MTI does contribute to the increasingly shallow waters in Harrison Bay, then it could further decrease access to coastal hunting areas. Long-term impacts to access would occur if construction of the MTI results in sedimentation or ocean floor changes that affect access to coastal and nearshore areas; however, the MTI is not expected to cause additional sedimentation or shoaling (Willow MDP Draft EIS Section 3.16). Some individuals may use the MTI after it is decommissioned as a stopover point when hunting in Harrison Bay, similar to their use of other islands such as Thetis Island; however, it is unknown how accessible the island would be by boat.

Gravel haul and module transport ice roads associated with the MTI would prohibit local use. Thus, some Nuiqsut furbearer, caribou, and goose hunters traveling overland by snow machine would likely experience reduced access during the winter and spring months when crossing through areas with ice roads. The gravel haul ice road between the MTI and the Tiŋmiaqsiuġvik gravel mine site would bisect high overlapping use areas for goose on Fish (Uvlutuuq) Creek. Thus, residents would likely experience reduced access to a portion of their goose hunting areas when ice roads continue to be operational in April. Impacts to access resulting from ice roads would only occur during the construction phase of the Project.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation of the Willow MDP EIS module delivery Option 1 is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the Willow MDP EIS module delivery Option 1 is identical to that provided above in Section B.2.c.

d. Findings

Module delivery Option 1 (Atigaru Point Module Transfer Island), in combination with any of the action alternatives (B, C, or D) would not result in any additional significant restriction on subsistence uses for communities in or near the Project area.

6. Evaluation and Finding for Module Delivery Option 2 (Point Lonely Module Transfer Island)

Module delivery Option 2 (Point Lonely Module Transfer Island), would locate the MTI at Point Lonely, a substantial distance west of Atigaru Point. Option 2 would also include module transport and gravel haul ice roads, but they would extend from the Tiŋmiaqsiuġvik gravel mine site and WPF to Point Lonely. This alternative would locate the MTI away from Harrison Bay, a key marine hunting area for Nuiqsut.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The effects of module delivery Option 2 on subsistence would be like those described for module delivery Option 1 with three important differences:

1. Option 2 would reduce potential impacts to Nuiqsut marine subsistence uses for seal and coastal caribou hunting activities.

2. Option 2 would increase potential impacts to winter subsistence uses to Utqiaġvik furbearer harvesting and other activities around Teshekpuk Lake.
3. Option 2 would increase the area and likelihood of disturbance for TCH caribou.

For Nuiqsut, impacts related to ice roads would be similar to those described for Option 1, as they would terminate in the same Project area locations (i.e., WPF, mine site), would cross Fish (Uvlutuuq) Creek in a similar area, and would affect similar subsistence uses.

The location of the MTI at Point Lonely would move potential marine impacts out of an area of moderate to high marine subsistence use for Nuiqsut into an area of low to limited use for both Nuiqsut and Utqiaġvik (Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*), thus reducing the likelihood of direct impacts on marine subsistence uses for either community. However, the gravel haul and module transport ice roads would extend farther west, along the east side of Teshekpuk Lake, and terminating to the north of Teshekpuk Lake at Point Lonely. Teshekpuk Lake is a traditional hunting ground for Nuiqsut and is still used by Nuiqsut hunters, particularly during the winter, and it is a key contemporary subsistence use area for many Utqiaġvik families and hunters year-round. In addition, the lands surrounding Teshekpuk Lake, including those to the north and east of the lake, are critical calving, post-calving, and insect relief habitats for TCH caribou. Ice roads associated with Option 2 would occur over a larger area, resulting in a greater area of disturbance for TCH caribou. In addition, summer Project activities at Point Lonely and along the ice road route, including construction noise, litter clean up (known locally as stick picking), human presence, and air traffic, which would be somewhat higher under Option 2, could affect caribou during the calving and insect relief seasons. This increased disturbance could result in alterations to caribou distribution closer to Nuiqsut and increased disturbance of calving and migrating caribou.

While module delivery Options 1 and 2 would directly affect a similar percentage of Nuiqsut harvesters overall, Option 2 would affect a greater percentage of Utqiaġvik subsistence harvesters of wolf and wolverine (19%) and caribou (21%). The ice road would occur in areas of low to moderate overlapping use for wolf and wolverine for Utqiaġvik and could affect resource availability of furbearers for hunters in the vicinity of Teshekpuk Lake. However, these impacts would only occur for the length of ice road operations during MTI construction module hauling operations and would cause primarily indirect effects.

Overall, Option 2 would reduce direct impacts to Nuiqsut subsistence uses within Harrison Bay but would increase potential indirect impacts to caribou resource availability for Nuiqsut and Utqiaġvik and direct and indirect impacts to Utqiaġvik wolf and wolverine hunters. Under both options, the impacts would occur during the Project's construction phase. Direct impacts to key subsistence uses would be lower under Option 2 for Nuiqsut due to the decreased impacts to marine and coastal subsistence uses, with a slight increase in potential impacts to caribou availability and a slight increase in impacts to furbearer subsistence uses for Utqiaġvik.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation of the Willow MDP EIS module delivery Option 2 is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the Willow MDP EIS module delivery Option 2 is identical to that provided above in Section B.2.c.

d. Findings

Module delivery Option 2 (Point Lonely Module Transfer Island), in combination with any of the action alternatives (B, C, or D) would not result in any additional significant restriction of subsistence uses for communities in or near the Project area.

7. Evaluation and Finding for Module Delivery Option 3 (Colville River Crossing)

Module delivery Option 3 (Colville River Crossing), would not construct an MTI, instead relying on existing infrastructure at Oliktok Dock. Similar to Options 1 and 2, Option 3 would include a module transport ice road, which would extend from the existing gravel road at Kuparuk DS2P to GMT-2, crossing the Colville River near Ocean Point (Figure 13). Option 3 would not require a separate gravel haul ice road from the mine site. Overall, Option 3 would make greater use of existing infrastructure but would cross through areas of heavy subsistence use to the south and southwest of the community.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The effects of module delivery Option 3 on subsistence would be like those described for module delivery Option 1 with four important differences:

1. Option 3 would reduce potential impacts to Nuiqsut marine subsistence uses for seal and eider and coastal caribou hunting activities (Figure 14 and Figure 15).
2. Option 3 would have a greater potential for direct impacts to Nuiqsut winter subsistence uses due to placement of the module transport ice road in key subsistence harvesting areas to the south and west of the community.
3. Option 3 would reduce the intensity and frequency of impacts associated with ice road traffic because of the lack of a gravel haul ice road and overall reduction in traffic levels.
4. Option 3 would reduce infrastructure and activity within subsistence harvesting areas for Utqiaġvik, thus minimizing direct impacts to that community.

Unlike Options 1 and 2, Option 3 would not require the construction of a gravel nearshore island and would instead use existing infrastructure at Oliktok Dock. Oliktok Dock would also be used under all action alternatives by barges and lightering vessels; under Option 3 there would be fewer barge and lightering vessel trips. Oliktok Dock is located in an area that is used by a slightly higher percentage of bearded seal (41%), ringed seal (35%), and eider harvesters (46%) compared to the MTIs under Option 1 and 2. However, activities at Oliktok Dock would occur in areas of existing industrial disturbance and would not involve the construction of new infrastructure; therefore these activities would be additive rather than introducing impacts into previously undeveloped areas. Increased barge activity and barge lightering would occur in an area of low to moderate offshore Nuiqsut subsistence use for eiders and seals, and low to moderate coastal Nuiqsut subsistence use for caribou. The location of the module transport staging area at Oliktok Point would move infrastructure and activities out of Utqiaġvik's marine subsistence harvesting area (Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*). Under Option 3, barge routes would stay farther offshore in Harrison Bay and avoid the high-use key Nuiqsut harvesting area for seal and eider. Thus, while the Option 3 analysis area overlaps with use areas for a greater percentage of Nuiqsut harvesters, the lack of new infrastructure compared to Option 1, the overall reduction in traffic, and avoidance of vessel traffic through nearshore high subsistence use areas in Harrison Bay would reduce the likelihood of direct impacts on marine subsistence uses for Nuiqsut.

For Nuiqsut, the types of impacts related to ice roads would be similar to those described for Option 1 and would terminate in the same Project area locations (i.e., WPF, mine site). However, under Option 3, the ice road would originate from the east, crossing through areas of high winter subsistence use for Nuiqsut near the Colville River to the south, southwest, and west of the community. Construction of the ice road under Option 3 would result in the community of Nuiqsut being completely encircled to the north, west, south, and east by gravel or ice roads for two winter seasons. Option 3 would affect a slightly higher percentage of Nuiqsut harvesters, primarily because the ice road crosses through areas of high overlapping use for the community, including along the Itkillik River, the Colville River, and overland to the south and southwest of the community. Peak hunting activities in those areas occur in the summer and

fall when the ice roads and associated activities would not be present. However, while overall hunting activity is lower in the winter, the area surrounding the Option 3 ice road is used heavily by those who conduct winter hunting of wolf (96% of harvesters) and wolverine (96%) (Figure 16), and caribou (91%). While the area where the ice road crosses the Colville River is heavily used by Nuiqsut moose hunters (94%), these activities occur in the fall when the ice road would not be present. The road also crosses through areas of moderate overlapping use for waterfowl in areas used by 45% of goose harvesters (Figure 17); thus, if the ice road season extends into April, then early spring goose hunting could be directly affected. The ice road crossing on the Colville River is upstream from key fish harvesting areas on the Niġliq and East channels of the river; however, the crossing is located far enough upstream from the CRD that it would minimize impacts to fish passage. Option 3 would require one less winter ice road season (two winters) compared to Options 1 and 2 (three winters). In addition, substantially less ground traffic would be required under Option 3; therefore, the ice road and associated traffic are less likely to deflect or disturb subsistence resources such as caribou and are less likely to deter subsistence harvesters from crossing.

The ice road would overlap with the periphery of overland subsistence use areas for Utqiaġvik in areas of low overlapping use (Figure 18). In addition, the ice road would overlap with areas of moderate overlap for Utqiaġvik moose hunting; however, these moose hunting activities generally occur in summer or fall, when the ice road would be absent, and therefore impacts would be minimal. Compared to Option 1, Option 3 would affect a similar percentage of harvesters for wolf and wolverine (Figure 19), and a slightly higher percentage of caribou harvesters, in areas of low overlapping use. Impacts under Option 3 would occur for the length of ice road and module hauling operations, which would occur over the course of two winter seasons.

Overall, Option 3 would reduce direct impacts to Nuiqsut and Utqiaġvik coastal and marine subsistence uses. Option 3 could potentially affect a greater percentage of Nuiqsut wolf and wolverine and winter caribou harvesters; however, the frequency and intensity of impacts would be less due to the lack of a gravel haul road and decrease in associated traffic, as well as the reduction in ice road seasons from three to two.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

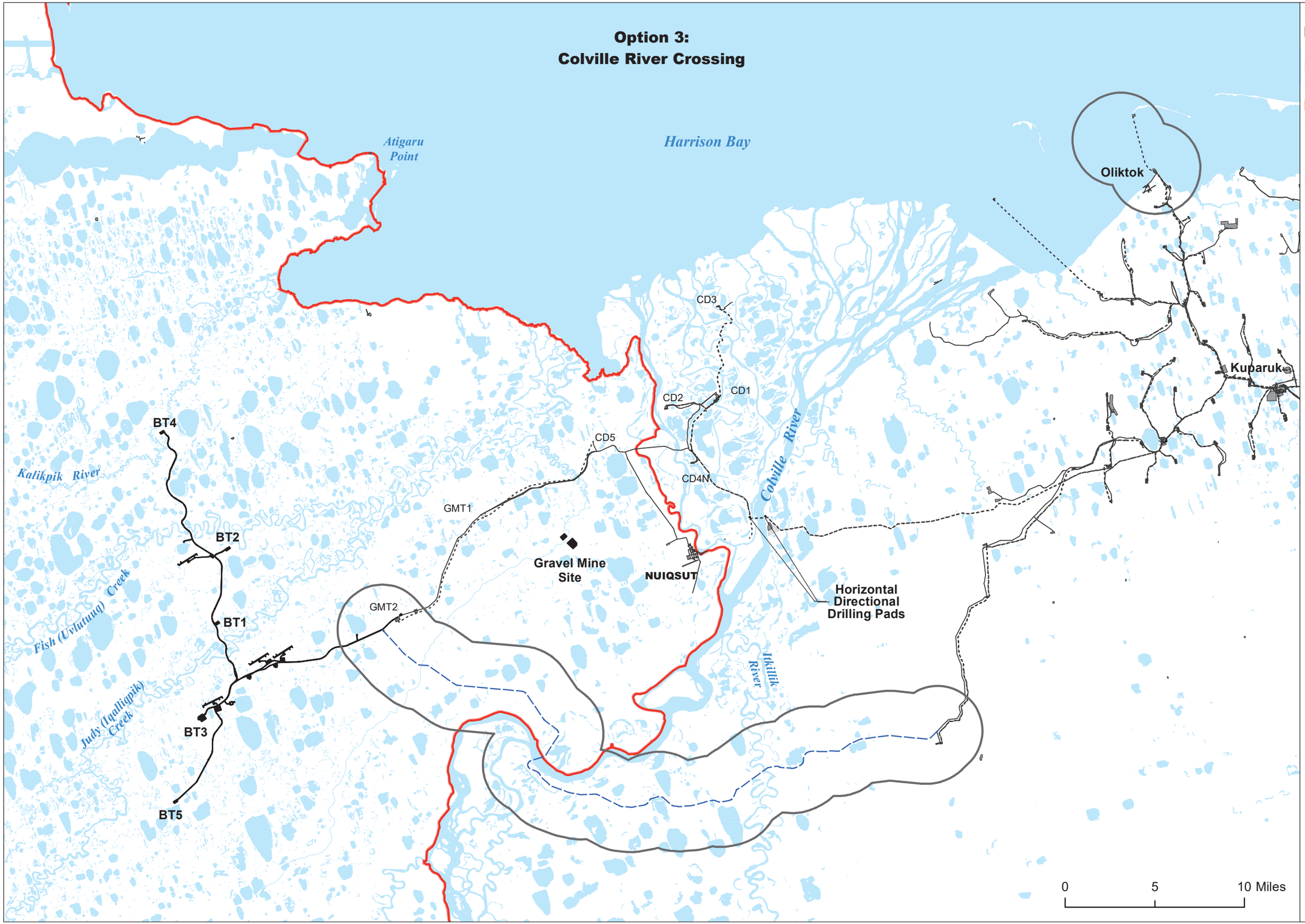
The evaluation of the Willow MDP EIS module delivery Option 3 is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the Willow MDP EIS module delivery Option 3 is identical to that provided above in Section B.2.c.

d. Findings

Module delivery Option 3 (Colville River Crossing), in combination with any of the action alternatives (B, C, or D) would not result in any additional significant restriction of subsistence uses for communities in or near the Project area.



Willow Proposed Development Features
- Module Transport Analysis
- Ice Road
- Gravel Footprint

Land Designation
- National Petroleum Reserve in Alaska

Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 13

Option 3:
Colville River Crossing

Atigaru Point
Harrison Bay
Oliktok
Kuparuk
CD3
CD2
CD1
CD5
CD4N
Colville River
BT4
Kalikpik River
BT2
GMT1
Gravel Mine Site
NUIQSUT
Horizontal Directional Drilling Pads
GMT2
BT1
Fish (Uvlutuuq) Creek
Itkillik River
Judy (Iqalliqpik) Creek
BT3
BT5
0 5 10 Miles

Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Caribou, 1995-2006 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 14

Option 3:
Colville River Crossing

Atigaru Point
Harrison Bay
Oliktok
Kuparuk
CD3
CD2
CD1
CD5
CD4N
Colville River
GMT1
Gravel Mine Site
NUIQSUT
Horizontal Directional Drilling Pads
GMT2
Itkillik River
BT4
BT2
BT1
BT3
BT5
Kalikpik River
Fish (Uvlutuuq) Creek
Judy (Iqalliqpik) Creek
0
5
10 Miles

Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Caribou, January 2008 through October 2016 [a] (High / Low)
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2018

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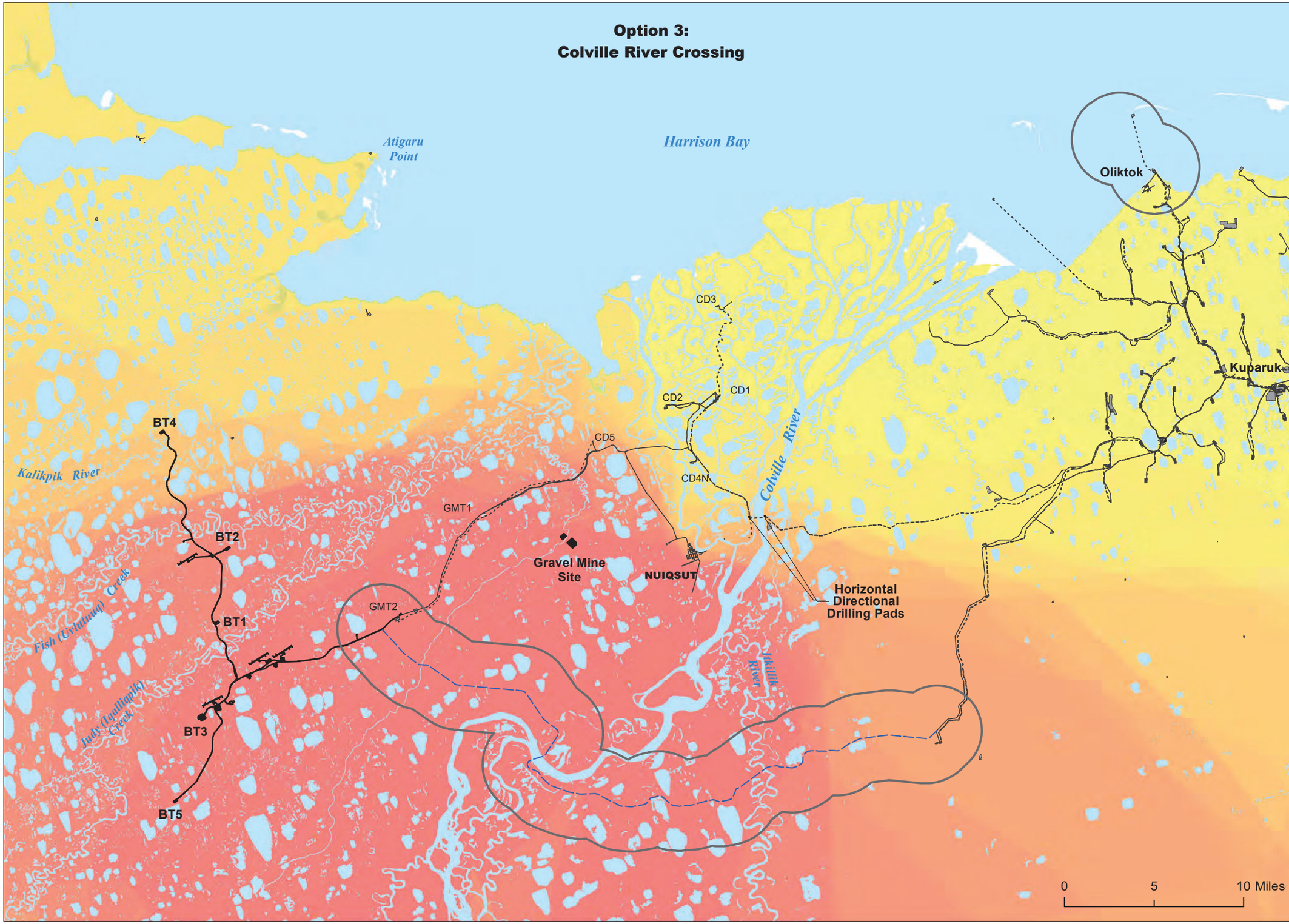
Figure 15



Willow Proposed Development Features

Subsistence Data

High / Low — Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006 [a]

Module Transport Analysis Area

Ice Road

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 16

Option 3:
Colville River Crossing

Atigaru Point
Harrison Bay
Oliktok
Kuparuk
CD3
CD2
CD1
CD5
CD4N
Colville River
GMT1
Gravel Mine Site
NUIQSUT
Horizontal Directional Drilling Pads
GMT2
Itkillik River
BT4
BT2
BT1
BT3
BT5
Kalikpik River
Fish (Uvlutuuq) Creek
Judy (Iqalliqpik) Creek
0 5 10 Miles

Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Geese, 1995-2006 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 17

Option 3:
Colville River Crossing

Atigaru Point
Harrison Bay
Oliktok
Kuparuk
CD3
CD2
CD1
CD5
CD4N
Colville River
BT4
Kalikpik River
BT2
GMT1
Gravel Mine Site
NUIQSUT
Horizontal Directional Drilling Pads
Fish (Uvlutuuq) Creek
BT1
GMT2
Itkillik River
Judy (Iqalliqpik) Creek
BT3
BT5
0 5 10 Miles

Willow Proposed Development Features

Subsistence Data

- High / Low — Overlapping Subsistence Use Areas Caribou, 1997-2006 [a]
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 18

Option 3: Colville River Crossing

Atigaru Point
Harrison Bay
Oliktok
Kuparuk
CD3
CD2
CD1
CD5
CD4N
Colville River
BT4
Kalikpik River
BT2
BT1
BT3
BT5
Fish (Uvlutuuq) Creek
Judy (Iqalliqpik) Creek
GMT1
GMT2
Gravel Mine Site
NUIQSUT
Horizontal Directional Drilling Pads
Itkillik River
0
5
10 Miles

Willow Proposed Development Features

Subsistence Data

- Overlapping Subsistence Use Areas Wolf and Wolverine, 1997-2006 [a] (High / Low)
- Module Transport Analysis Area
- Ice Road
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 19

8. Evaluation and Finding for the Cumulative Case

Willow MDP Draft EIS and SDEIS Section 3.19, *Cumulative Effects*, contains a description of the cumulative case, which evaluates the impacts of the proposed action in conjunction with past, present, and reasonably foreseeable future actions on subsistence. Reasonably foreseeable future actions considered in the cumulative analysis are provided in Willow Draft MDP EIS and SDEIS Section 3.19 and include oil and gas exploration, pipeline and oil field development, and transportation projects. The cumulative impacts of climate change on subsistence are considered as part of the future condition on the North Slope.

Reasonably foreseeable oil development that could contribute to cumulative impacts on subsistence for Nuiqsut, Utqiaġvik, and other North Slope communities include continued development of Kuparuk and Prudhoe Bay, the Nanushuk Development, Nuna DS2, Liberty Development in the Beaufort Sea, federal and state offshore lease sales and development, and the Alaska LNG or Alaska Stand Alone pipelines. In addition, the BLM is currently developing an oil and gas leasing program in the Arctic National Wildlife Refuge, which could lead to oil and gas exploration and development in the 1002 (Coastal Plain) area. The BLM is also revising the NPR-A integrated activity plan, which could affect oil and gas leasing and development in that area. Other reasonably foreseeable transportation and infrastructure projects include airport and community infrastructure improvements; continued marine vessel and air traffic associated with shipping, development, scientific research, and recreation and tourism activities in the region; and new permanent or seasonal roads including the Colville River Access Road and the Arctic Strategic Transportation and Resources Project, which could lead to development of roads linking North Slope communities to each other and ultimately the Dalton Highway.

The BLM's 2019 Draft NPR-A IAP/EIS addresses the potential impacts of a no action alternative (Alternative A) and three action alternatives (Alternatives B, C, and D), which differ in the areas that would be made available for NPR-A leasing and infrastructure, and which would contribute to the cumulative effects of the Project in different ways. While selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, selection of Alternative D would likely result in greater cumulative impacts on subsistence. The potential additional cumulative impacts under the NPR-A IAP/EIS Alternative D are discussed below where relevant.

a. Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

Cumulative effects on subsistence would be similar if Alternatives B or C are selected in the ROD for the Project. If Alternative D is selected, cumulative effects would differ due to the lack of a year-round gravel access road. Construction of the Project without a year-round access road could substantially reduce displacement or deflection of TCH caribou but would result in somewhat higher disturbances related to air traffic and would not provide year-round subsistence access. The module delivery options would not contribute substantially to the cumulative case as most associated activities would occur solely during construction. While Option 1 would have greater overall direct impacts to Nuiqsut marine and coastal subsistence uses, most of these impacts would cease after the construction phase ended.

Regardless of the alternative selected, cumulative oil and gas activity, transportation projects, and climate change will increasingly restrict subsistence uses and affect the availability of subsistence resources such as caribou and marine mammals. This analysis focuses in part on the impacts that would be associated with an access road to the Project (Alternatives B and C) and assumes access roads to any future development west or south of the Willow development in the NPR-A. For the disconnected access road scenario (Alternative D), impacts from access roads as described below would not accumulate from development of the Project, though they may accumulate from other transportation projects in the region. Impacts related to air traffic would accumulate, to a greater degree, under Alternative D because of the slight increase in air traffic required to reach the Project area during the snow-free months.

Since 2000, oil and gas exploration and development has expanded into Nuiqsut's core subsistence use areas, including the CRD (Alpine drill sites CD1 through CD4) and to the north and west of the community toward Fish (Uvlutuuq) Creek (Alpine drill site CD5, GMT-1, and GMT-2). As a result, the frequency of conflicts between subsistence and development activities have increased (SRB&A 2019). The Project, in addition to other reasonably foreseeable future activities such as the Nanushuk development, would contribute to the cumulative effects of development on subsistence resources and activities because it would represent a net increase in the amount of land used for oil and gas and other development, in addition to a related increase in industrial activity, including air traffic.

The Alpine CD5, GMT-1, and GMT-2 development projects are present or presently underway actions that are most closely connected to proposed development in the BTU. These developments were facilitated by previous developments, including Alpine CD5 (for GMT-1) and GMT-1 (for GMT-2). Alpine CD5 was the first major oil and gas development west of the CRD and is connected to Alpine via a bridge and road. Development of BT1 through BT5, particularly in the case of a year-round access road, would likely facilitate future development to the west and southwest of Nuiqsut within the NPR-A. Development of these five drill sites, in combination with existing and future developments, would continue a pattern of development infrastructure surrounding Nuiqsut to the north, west, and southwest of the community. Despite the greater distance from the community, many in Nuiqsut perceive that they are also surrounded to the east by infrastructure associated with the Prudhoe Bay and Kuparuk developments. These areas are now considered off-limits to subsistence uses despite being considered part of the community's traditional use area (SRB&A 2018b). Development of the Nanushuk project would introduce infrastructure directly to the east of the CRD and leave only the southerly direction untouched by oil and gas infrastructure. Despite the lack of infrastructure to the south, oil and gas exploration has occurred to the south of the community and may result in oil and gas development in the future. Finally, development of the BTU would introduce a major oil and gas development within Utqiaġvik's hunting area, although Project development would be located at the eastern edge of the subsistence use area for the community, within an area that provides a minimal amount of subsistence resources compared to land north and west of Teshekpuk Lake. Development of the BTU could lead to additional future development in the BTU and elsewhere in the NPR-A that is within the core harvesting areas for Utqiaġvik and Atqasuk, thus increasing the potential for direct impacts to subsistence users from other communities.

In addition to the additive effects of increasing oil and gas infrastructure in the region, increased activity, including oil and gas exploration and seismic activity, air traffic, vessel traffic, scientific research, recreation, and sport hunting and fishing activities, would also contribute to subsistence impacts by increasing the frequency of noise and air traffic disturbances, vessel disturbances, and interactions with non-local researchers, workers, and recreationists. Increased noise disturbances would contribute to existing impacts on subsistence resource availability. Ongoing disturbances within the NPR-A, in combination with the Project, would likely contribute to changes in the availability of caribou within Nuiqsut's harvesting area. Barges and vessel traffic associated with the Project would occur only during construction and would have relatively minimal impacts on resource availability. However, these activities, in combination with increased and ongoing vessel traffic associated with oil and gas development of offshore leases in the Beaufort and Chukchi seas, could have cumulative impacts on the availability of marine mammals for the North Slope communities of Nuiqsut, Utqiaġvik, Wainwright, and Point Lay. In particular, bowhead whales are a resource of high importance to the coastal communities of the North Slope, and residents could experience reduced harvest success if increased offshore activity causes deflections or behavioral changes in whales.

Development activities and infrastructure can change hunting patterns and use areas over time by introducing barriers, impediments, or restrictions to access; by facilitating access to lesser used hunting areas via roads; or by causing changes to the availability of subsistence resources in the vicinity of development. Nuiqsut's core subsistence use area has shifted west over time due to Prudhoe Bay development, and recent research has documented decreased use of traditional use areas, including the Niġliq Channel, in part due to development activities and infrastructure (SRB&A 2019).

Decreased use areas in some development areas have occurred while road-accessible areas have seen increased use. The Kuukpik Spur Road was constructed in 2014 and 2015 to facilitate access for Nuiqsut hunters to the Alpine development's roads. The road has provided access to residents, and the road system has seen increased use in every year since its construction. Despite the increased use, caribou harvests within the road-connected area, as a percentage of the total reported harvest, have not seen a corresponding increase (Willow MDP Draft EIS Section 3.16, *Subsistence and Sociocultural Systems*) (SRB&A 2019). Some hunters indicate that their use of the road system offsets decreased harvests closer to the community, which they believe are a result of deflection from the road itself (SRB&A 2018a). Thus, facilitated access to hunting areas via roads is a countervailing effect that partially mitigates the impacts of roads and associated development on subsistence resource availability; this benefit is particularly prevalent for hunters who are less active, do not have access to other non-road modes of transportation (e.g., snow machines, ATVs), or have limited time to spend harvesting resources. Similar to the Spur Road, the proposed Colville River Access Road would provide increased access to the upriver hunting areas along the Colville River, which could also help to offset impacts resulting from increased development infrastructure to the north and west of the community. Current access to the main channel of the Colville River can be difficult due to shallow river channels. Construction of the Colville River Access Road would be particularly important if the community experiences reduced hunting success to the west of Nuiqsut or in the Niġliq Channel.

Increased development infrastructure on the North Slope would continue to cause alteration and degradation of habitats for key subsistence resources including caribou, furbearers, fish, and goose. Over time, these changes could affect the health and abundance of different subsistence resources on the North Slope. If development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance. Such a scenario could occur if the BLM selects Alternative D in the 2019 Draft NPR-A IAP EIS. Alternative D would make areas surrounding Teshekpuk Lake available to oil and gas leasing and infrastructure development. Under this scenario, impacts related to the health and abundance of the TCH would likely extend to subsistence users of the herd including Nuiqsut, Utqiaġvik, Anaktuvuk Pass, Atqasuk, and Wainwright.

The cumulative effects of current and future activities related to restrictions on access to traditional areas, changes in hunting patterns, and reduced resource abundance and availability are likely to continue as long as oil and gas exploration and development continues on the North Slope.

b. Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

The evaluation of the cumulative case is identical to that provided above in Section B.2.b.

c. Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The evaluation of the cumulative case is identical to that provided above in Section B.2.c.

d. Findings

1. **Reductions in the abundance of caribou described above for the cumulative case and selection of the 2019 Draft NPR-A IAP EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass.**
2. **Reductions in the availability of subsistence resources described above for the cumulative case may significantly restrict subsistence uses of marine mammals for the communities of Nuiqsut, Utqiaġvik, Wainwright, and Point Lay, and caribou for the community of Nuiqsut.**
3. **Limitations on subsistence user access described above for the cumulative case may significantly restrict subsistence uses for the community of Nuiqsut.**

Because these effects may reach the level of a significant restriction, a positive determination pursuant to ANILCA Section 810 is required at the draft stage and a hearing must be held with subsistence users before final determinations (described in ANILCA Section 810(a)(2)) can be made.

This evaluation concludes that the cumulative case could significantly restrict subsistence uses based on the BLM's three factors for consideration. Therefore, this draft finding of "may significantly restrict" is only triggered by the following factors that must be considered:

1. Reduction in the abundance of subsistence resources caused by a decline in their population
2. Reduction in the availability of resources caused by alteration of their distribution
3. Limitation of access by subsistence harvesters

1. The Rationale for the Findings of Reduction in the Abundance of Subsistence Resources Under the Cumulative Case

The 2019 Draft NPR-A IAP/EIS considers a no action alternative (Alternative A) and three action alternatives (Alternatives B, C, and D). Under the cumulative case, Alternatives A, B, and C are not expected to cause large-scale changes in the abundance of caribou, although they would likely cause displacement of caribou. Under Alternative D, approximately 75% of the calving range of the TCH would be made available for oil and gas leasing and infrastructure development. Depending on the location of development in these areas, Alternative D of the 2019 Draft NPR-A IAP/EIS could cause substantial displacement from calving and insect relief habitat, resulting in reduced calf survival and herd productivity. While no quantitative analysis of community harvests exists by herd, Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass all harvest from the TCH, and all of these communities rely heavily on subsistence harvests of caribou. A large decline in the abundance of TCH could significantly restrict subsistence uses of the TCH for these communities.

2. The Rationale for the Findings of Reduction in the Availability of Subsistence Resources Under the Cumulative Case

The GMT-1, GMT-2, and Alpine CD5 development projects are present or are presently underway actions that are most closely connected to the proposed Project in the BTU. Development of the Project, in combination with existing and future developments, would continue a pattern of development infrastructure surrounding Nuiqsut to the north, west, and southwest of the community that alter the traditional distribution of caribou within the Nuiqsut core subsistence use area. Additionally, despite the greater distance from the community, many in Nuiqsut perceive that they are also surrounded to the east by infrastructure associated with the Prudhoe Bay and Kuparuk developments. These areas are now considered off limits to subsistence uses despite being considered part of the community's traditional use area.

The availability of marine mammals, including whales, may also decline under the cumulative case as a result of increased offshore development and associated vessel and other activities in key marine mammals harvesting areas for Nuiqsut, Utqiaġvik, Wainwright, and Point Lay.

The BLM concludes that altered distributions of TCH caribou and furbearers that are likely to occur during construction and operation of the Project, together with the existing GMT and Alpine developments and reasonably foreseeable developments within offshore and onshore NPR-A leases (under all 2019 Draft NPR-A IAP/EIS alternatives), could cause a major redistribution of resources within the Nuiqsut core subsistence areas that would affect these resources for Nuiqsut hunters.

3. The Rationale for Findings of Limitations on Subsistence User Access Under the Cumulative Case

Nuiqsut's core subsistence use area has shifted west over time due to the development in Prudhoe Bay and recent research has documented decreased use of traditional use areas, including the Niġliq Channel, in part due to development activities and infrastructure (SRB&A, forthcoming). This shift, together with

impacts anticipated to occur from development of the Project (described under Alternatives B, C, and D), the BLM expects that limitations to subsistence access and the reduced resource availability attributable to development of the Project, would result in an extensive interference with Nuiqsut hunter access.

C. NOTICE AND HEARING

ANILCA Section 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected" until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Sections 810(a)(1) and (2). The BLM will provide notice in the *Federal Register* that it made positive findings pursuant to ANILCA Section 810 that Alternatives B, C, and D and the cumulative case presented in the Willow MDP Draft EIS as supplemented by the SDEIS, met the "may significantly restrict" threshold. As a result, public hearings will be held in the potentially affected communities of Anaktuvuk Pass, Atqasuk, Nuiqsut, Point Lay, Wainwright, and Utqiaġvik in order to solicit public comments from the potentially affected community and subsistence users. Notice of these hearings will be provided in the *Federal Register* and by way of the local media, including the Arctic Sounder newspaper, and KBRW, the local Utqiaġvik (Barrow) radio station with coverage to all villages on the North Slope. Meeting dates and times will also be posted on the BLM's website at www.blm.gov/alaska.

D. SUBSISTENCE DETERMINATIONS UNDER THE ANILCA SECTIONS 810(A)(3)(A), (B), AND (C)

ANILCA Section 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected" until the federal agency makes the three determinations required by ANILCA Sections 810(a)(3)(A), (B), and (C). The three determinations that must be made are:

1. That such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands.
2. That the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition.
3. That reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such actions.

These determinations will be provided in the Final ANILCA Section 810 Evaluation issued in conjunction with the Willow MDP Final EIS, using input from the subsistence hearing conducted in the potentially affected community.

E. BLM AUTHORIZED AGENT

_____ _____

Name & Title Date

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Willow Master Development Plan

Supplement to the Draft Environmental Impact Statement

Appendix D
Section 106 Cultural Resources Findings: Process and Analysis

March 2020

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List of Acronyms

AHRS	Alaska Heritage Resources Survey
BLM	Bureau of Land Management
BMP	best management practice
CPAI	ConocoPhillips Alaska, Inc.
IAP/EIS	Integrated Activity Plan/Environmental Impact Statement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPR-A	National Petroleum Reserve in Alaska
NRHP	National Register of Historic Places
NSB	North Slope Borough
Project	Willow Master Development Plan Project
TLUI	Traditional Land Use Inventory

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1.0 CULTURAL RESOURCES FINDINGS: PROCESS AND ANALYSIS

The cultural history of northern Alaska is described in detail in the National Petroleum Reserve in Alaska (NPR-A) Final Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) (BLM 2012). Cultural resources found on the North Slope broadly represent a long prehistory of land use, followed by more recent historic land use by Iñupiat and influences from Euro-Americans beginning in the nineteenth century. Cultural resources on the North Slope can represent a broad variety of types, ranging from distinctly human-made objects and changes to the landscape, to places with less definitive expressions of use by people in the past, albeit with great significance to North Slope communities. Such resources include but are not limited to:

- Prehistoric and historic archaeological sites, features, and artifacts, such as those associated with camps and villages, buildings and structures, dwellings (e.g., sod houses, semi-subterranean houses, tent rings), production and use of objects (e.g., discarded tools, tool-making debris), subsistence activities (e.g., discarded animal bone accumulations, reindeer herding fences, ice cellars, caches), and transportation (e.g., boat or sled remains).
- Places significant to Iñupiat heritage and traditional land use (e.g., burial places; hunting, fishing, trapping areas, and camping areas).
- Cultural landscapes and areas important for reasons of cultural identity or religious significance.
- For purposes of this Supplement to the Draft Willow Master Development Plan Environmental Impact Statement, paleontological resources are also considered.

A variety of federal, state, and local regulations govern how cultural resources are described and analyzed. Although compliance requirements for these regulations are similar, the types of cultural resources considered, and the implementation of cultural resources review, differ. The National Environmental Protection Act (NEPA) requires disclosure and consideration of impacts to the human environment, of which cultural resources are considered a subcategory (40 CFR 1508.14). Section 106 of the National Historic Preservation Act (NHPA) (54 USC 306108) and its implementing regulations (36 CFR 800) require federal agencies to consider the effects of their undertakings on historic properties (prehistoric or historic districts, sites, buildings, structures, or objects included in, or eligible for inclusion on, the National Register of Historic Places [NRHP]). Both NEPA and Section 106 of the NHPA require consultation with agencies and key stakeholders (including tribal and municipal governments and members of the public), which affords a reasonable opportunity for consulting parties to comment on the potential for impacts to cultural resources or alert the lead agency to the presence of potentially impacted cultural resources. Other regulatory statutes that protect cultural resources include the Antiquities Act (16 USC 431-433), the Historic Sites Act (16 USC 461-467), the Archaeological and Historic Preservation Act (16 USC 469-469c), the American Indian Religious Freedom Act (42 USC 1996), the Archaeological Resources Protection Act (16 USC 470aa-470ll), the Abandoned Shipwreck Act (43 USC 2101-2106), the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.), Executive Order 13007: Indian Sacred Sites, and the Alaska Historic Preservation Act (AS 41.35). The Willow Master Development Plan Project (Project) would also require a Certificate of Traditional Land Use Inventory (TLUI) Clearance from the North Slope Borough (NSB), certifying that no TLUI sites would be negatively impacted.

The Office of History and Archaeology's Alaska Heritage Resources Survey (OHA 2020), which contains an inventory of all documented archaeological sites in the state of Alaska, is the primary source of information for archaeological resources in the Project area. A subset of the NSB's TLUI within the Project vicinity was acquired from the NSB Department of Iñupiat History, Language, and Culture (NSB 2019, 2020) The TLUI is the primary source of information regarding Iñupiat traditional use areas, although the Bureau of Land Management (BLM) pursued additional information through consultation with local and regional tribal and municipal governments and Alaska Native corporations, and the public. Academic literature, agency documents, and cultural resources survey reports from other studies conducted within the Project area provided more robust information about sites documented in the area.

Recent cultural resource surveys conducted in support of the Project (Reanier 2019, 2020) provided the most current archaeological site location and condition information for the Project area.

1.1 Potential Impacts

Direct impacts are those that are caused by, and occur during, the Project (36 CFR 800.5; 40 CFR 1508.8), and are primarily limited to the Project footprint. Ground-disturbing activities (e.g., drilling, gravel mining, construction and use of grounded ice bridge) pose the greatest threat of direct impacts to cultural resources, especially archaeological sites, by destabilizing, damaging, or destroying subsurface and aboveground cultural resources and contexts. Support activities (including the transport and staging of materials, heavy equipment, and personnel) and manufacture and use of the grounded ice roads and pads could also directly affect surficial and shallowly buried cultural resources through inadvertent ground disturbance, vibration, and compaction.

Indirect impacts are those that occur beyond the Project footprint or after the Project's completion and are reasonably foreseeable. The greatest indirect threats to cultural resources include altering the setting of historic properties and increasing access to otherwise remote and difficult-to-access locations, followed by increased foot or vehicle traffic, and resulting in sensitive areas being eroded, vandalized, or looted.

1.2 Findings

The Alaska Heritage Resources Survey (AHRS) (OHA 2020) lists 34 cultural sites documented within or overlapping the BLM-recommended 2.5-mile cultural resources analysis area, none of which fall within the Project footprint. Two of these sites are documented as having been destroyed. Of the remaining 32 sites, 7 are paleontological, 6 are prehistoric, 9 are historic Iñupiat, and 10 are historic Euroamerican. The NSB TLUI data request for traditional land use sites within or overlapping the analysis area is pending (NSB, anticipated February 2020). Of these sites, nine sites associated with the Distant Early Warning (also known as "DEW") Line system have been evaluated for their eligibility for the NRHP (XBP-00039, XBP-00050, XBP-00051, XBP-00052, XBP-00053, XBP-00054, XBP-00055, XBP-00058, and XBP-00059); all were determined eligible.

The Supplement to the Draft Willow Master Development Plan EIS analysis area has been examined repeatedly for cultural resources due to nearby oil and gas development projects and academic studies since 1980 (ASRC Energy Services Alaska Inc. 2019; Lobdell 1981, 1982, 1985, 1988, 1991, 1993, 1996, 1998a, 1998b, 1999; Lobdell and Lobdell 1999; Mobley & Associates 2016; Reanier 2003, 2004, 2008, 2013, 2014, 2019; SRB&A 2018).[1] The results of the previous surveys indicate previously undocumented cultural resources are unlikely to exist in the analysis area. The AHRS site nearest to the gravel road footprint is the Kuparuk Pingo site (XBP-00033), which was excavated by Lobdell in 1983 (Lobdell 1986) and revisited by Reanier in 2013 (Reanier 2013). The nearest AHRS site to the proposed heavy-haul ice road route is HAR-00073, a Denbigh Flint Complex site roughly 750 feet south of the proposed ice road route (Reanier 2020). The proposed location for the Option 3 grounded ice bridge across the Colville River is roughly 0.5 mile downriver (south and east) of the last outcrops of the Prince Creek Formation, a well-documented site that still produces paleontological materials (Druckenmiller 2009, 2010; personal communication 2020).

Areas of traditional subsistence land use are a critical cultural element in the Project area and are addressed in the Draft Willow MDP EIS, Section 3.16, *Subsistence and Sociocultural Systems*. TLUI clearance is required by the NSB to ensure avoidance of sensitive Alaska Native cultural sites prior to issuing a Development Permit or Administrative Approval, and the Proponent must seek TLUI clearance prior to receiving a permit from the NSB. Potentially undocumented places that are significant to North Slope heritage, but lack definitive expressions of land use, are best identified and assessed through consultation with local and regional tribal and municipal governments and Alaska Native corporations,

[1] This list is not exhaustive

and other community members. NEPA and Section 106 consultation efforts with these entities within Nuiqsut and the NSB resulted in no expressed concerns for specific cultural resources within the Project area.

Best management practice (BMP) E-13 in the NPR-A IAP/EIS (2013) seeks to avoid adverse impacts to any cultural resources by ground-disturbing activities by requiring field surveys prior to the commencement of proposed activities. As a general practice, BLM seeks to avoid adverse impacts and the need for mitigation by encouraging that activities be conducted away from culturally sensitive areas. To ensure appropriate treatment of inadvertent discoveries, the Project Proponent, ConocoPhillips Alaska, Inc. (CPAI), maintains a Fossil and Artifact Finds Standard Operating Procedure and requires cultural awareness training as required under BMP I-1 (BLM 2013).

Surveys to identify cultural resources in the analysis area for Option 3 will be conducted in summer of 2020 (Reanier 2020). CPAI opts to route all Project components at least 500 feet from all recorded cultural sites and will avoid the Prince Creek Formation when constructing the ice road crossing of the Colville River near Ocean Point. No cultural resources have been identified within the proposed Project footprint; thus, it is unlikely that the Project would result in direct impacts to historic properties or paleontological resources. Cultural resources and paleontological resources located outside the Project footprint are also unlikely to be impacted by the Project.

Access to Project infrastructure is controlled and not accessible to members of the public, and Project staff would undergo cultural awareness training prior to working on site, thus reducing the risk of inadvertent disturbance of culturally significant sites. Although increased access to cultural resources has been documented to correlate strongly with increased instances of vandalism and looting of cultural resources sites (Hedquist, Ellison et al. 2014; Spangler, Arnold et al. 2006), these impacts are improbable due to conditions specific to the Project area and timeline. Ice roads and pads would only be used during winter construction seasons, during which times any nearby cultural resources would be inaccessible due to snow cover. Access to cultural resources areas in the summer months, while possible, is made complicated by the surrounding terrain. Off-road travel in the Project area during summer months is suboptimal by foot or vehicle, as the tundra during this season is uneven, frequently inundated, and spongy. The cultural resources sites within 2.5 miles of the Project are also not of the type(s) typically considered valuable to looters and are therefore less likely to warrant illicit transit of the landscape.

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